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Prevention of Acute Lobar Pneumonia
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The Death Rate of Washington
W. F. Wilcox

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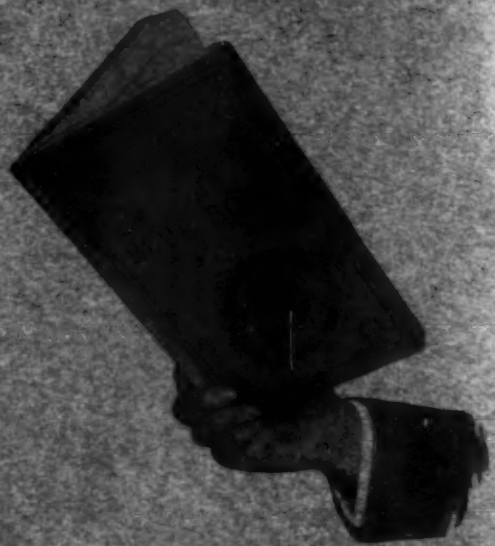

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Vol. VII JUNE, 1917 No. 6

MILITARY SANITATION IN THE PRESENT WAR.

THORNDIKE SAVILLE, C. E.,
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PREFACE.

The present war has produced only two small books dealing with military hygiene and sanitation. They present briefly and concisely many of the solutions to perplexing problems which war conditions have caused, and indicate many new phases of sanitary endeavor and accomplishment.

One of these books—"Sanitation in War," by Major Lelean of the British Medical Corps, is a compilation of nine lectures given during the war at the R. A. M. College. These treat of the generalities of war-time sanitation and consider such topics as physical fitness of soldiers, antityphoid inoculation, hygiene of the march, water supply, rôle of insects, etc. It is, so far as the writer is aware, the best short manual on sanitation which has yet appeared in the English language.

The other book was published only last year (1916) and is entitled "La Pratique de l'Hygiene en Campagne" by Andre Tournade of the French Sanitary Service School.

This book of two hundred pages is quite detailed, and considers a great variety of matters in very brief style. It is the most complete, and yet brief, handbook on the general subject of military hygiene and sanitation which has yet appeared. It is full of many valuable hints and advice growing out of experience in the present war.

Neither of these books are published in the United States (although "Sanitation in War" is handled by Blakiston, Philadelphia) and no translation of the "Practique de l'Hygiene" has yet appeared. On account of the valuable information, of such immediate utility just now to sanitarians in the United States, the writer has made brief abstracts of the more useful and novel features of these two books. The French book especially has been quite fully abstracted, omission being made chiefly of material concerning medical rather than sanitary practice.

The intention has been to give only such matter as is likely to be new to American readers and not readily found in current treatises. For this reason common practices in military sanitation have been deliberately omitted, and the following notes do not pretend to be a complete exposition of the subject. This article has been prepared in the hope that some new ideas from the war zone may be brought to the attention of American sanitary officials for use in the present crisis. For more detailed comment readers are referred to the original sources.

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MILITARY SANITATION IN THE PRESENT WAR.

1. Baths [F].*

THE author states that wherever men are encamped for any length of time, baths should be installed with both hot and cold water. An indispensable adjunct of these is said to be a hair dresser (coiffeur) who "will complete the toilet of the men by trimming their hair"!

The Tub.—Where conditions must be most primitive small vats or tubs that happen to be at hand may be used. The water is warmed on the cook fire and the men are brought in groups of ten, made to undress and are scrubbed. In especially unfavorable conditions in cold weather the bathing may be done in the stables where the heat from the animals will maintain a comfortable temperature.

Shower-baths.—A unique arrangement has been devised for the vicinity of the trenches (Figure 1). More elaborate arrangements are provided for permanent encampments. There are also in service some bath trains, fully equipped for sterilization of clothes, bathing of men, etc.

* Matter taken from "Practice de l'Hygiene" is prefaced thus [F]. That from "Sanitation in War" by [B].

2. Battle Field Sanitation [F].

This comprises:

(1) *Burial of corpses*, and amelioration of conditions arising from previously imperfectly buried bodies. This task is important and influenced by the condition of the country, the geology of the place, and the regard for pollution of underground waters.

(2) *Burial of human corpses with quicklime* and incineration of animal corpses and general organic filth.

(3) *Disinfection of polluted wells.*

(4) *Disinfection of field hospitals.*

3. Beds (Temporary).

The French have found that two wooden horses placed at each end, a woven brush or reed matte placed between and a mattress on top furnish quickly available emergency cots.

4. Bivouac [F].

During bivouacs the Sanitary Service is concerned in the construction of shelters. It is stated that several

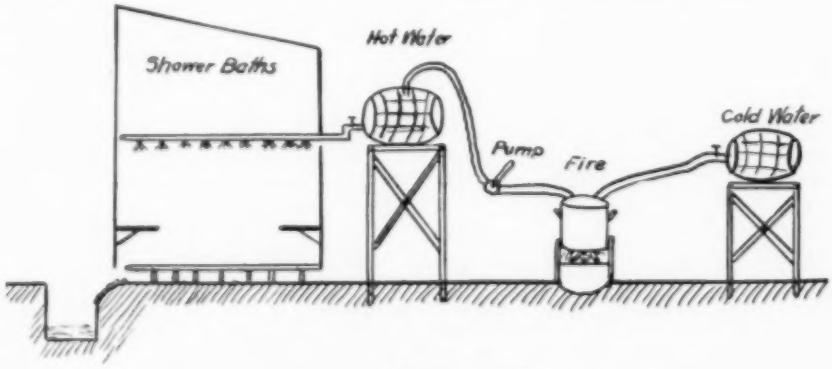


Figure 1

sheets of newspaper placed inside the shirt makes excellent insulation against cold, especially if it is impossible to have fires.

5. Burial of the Dead [*F*].

The disposal by burial of the enormous numbers of dead on the field of battle presents no inconsiderable problem. The French have promulgated the following rules for burial in ground recently evacuated by the enemy:

A convenient site is chosen, as near as possible to where the men have fallen. Corpses should not be buried near farms, sanitary structures, roads, rivers, water courses, or in places likely to be flooded. A silicious or calcareous region, dry, permeable, slightly sloping and studded with trees is the best, if available.

Unless specifically disapproved, common graves, holding 100 bodies, are used. Two principles should be observed in digging the trench: (1) Easy access of air, and (2) provision for circulation of ground water. These principles must be observed to promote bacterial growth and hence rapid decomposition. By the same token, use of antiseptics on the bodies is ordinarily forbidden. All clothing is removed from the bodies before burial, if decomposition is not too advanced.

The ditches shall contain only a single row of corpses, and shall be of the following dimensions: 1.60 meters deep, 30 meters long, 3.5 meters wide (In English measure roughly 5′ deep, 100′ long, 11′ wide). The main trench is drained by a small ditch in the bottom, about 1 foot deep and lined with branches. stones, etc.

At the highest point of the burial ditch, an opening is left, to serve as a sort of chimney for the gases of putrefaction. It is well to cover the corpses first with branches, then the useless clothes, then charcoal, then turf, then earth; the whole forming a depth of three to five feet, and making a low mound.

The disposal of the dead lying between the enemy's lines and the first trenches, and of those dead in the trenches, is a difficult problem, and one often insurmountable. Putrefaction of the bodies in the open air is not uncommon. So far as possible bodies are brought in under cover of night, and properly disposed of.

When the burial of bodies becomes impossible, or when in advancing over new territory, recently interred bodies are uncovered, it is best to treat them at once with an abundance of quicklime, or ten per cent. ferric sulphate. Better yet to treat with a 1/20 creosol or formalin solution. A chloride of zinc solution, followed by ferric sulphate produces anti-septic, mummifying and larvicidal conditions.

One cannot help but join in the British lament over the unreasoning sentiment which thus far has prevented the incineration of dead bodies. If popular feeling were such that the bodies of those slain in battle could be incinerated, a vast deal of time and trouble would be eliminated, and much more sanitary conditions achieved. In this connection it is interesting to note that reports continually reach this country concerning the rendering of dead bodies by the Germans. The horrified American press has devoted

considerable space to the activities of the "Corpse Utilization Establishment (Kadaververwertungsanstalt) at Evergnicourt." It it alleged that the dead bodies are fastened in bundles of three or four with iron wire and despatched to the rendering establishment. Here they are rendered, the products being a lubricating oil won from the fats, and a compressed "stick" which is used as fodder for hogs. The German government has denied that human bodies were thus treated, the Allied governments have affirmed it. In any event such a method of disposal would seem as satisfactory as burial of the dead in a common grave where the bodies may not only decompose and render foul the ground and water supply, but also interfere with subsequent military operations.

6. Cantonments [*F*].

The hygiene of a cantonment comprises the following preliminary factors:

1. *A sanitary survey*—conducted by a doctor, and including the epidemiological history of the place, quality of the water, health of the inhabitants, etc.

2. *An estimation of the capacity of the place* and its provisions (sanitary and otherwise) for receiving men and horses.

The three main considerations before the sanitary officer after occupation of the cantonment are:

1. *Protection of the Ground.*—The first necessity is the provision of temporary latrines, that the men may not pollute the soil or gardens or create offenses near houses. The regulation latrine ditches should be made as soon as practicable. Care should be taken to prevent stagnant pools of urine or wash water in the ditches. The disposal of organic filth and refuse from kitchens and slaughtering places is best accomplished temporarily by treatment with quicklime. This indeed seems the panacea most used by the French for a considerable variety of sanitary ills. They use it to a much greater extent than either the British or Americans. Stable refuse is carefully carted at least a kilometre distant and in a direction opposite to the prevailing winds. There it is dumped on the fields. Surface drains should be among the first permanencies of any camp.

2. *Provision for Pure Water.*—The general rule is to consider all water polluted, and to sterilize it. Signs are posted stating "Dangerous Water" or "Drinking Water." Such signs as "Rinsing Water" or "Wash Water" are absolutely forbidden. Sterilization is accomplished by hypochlorite of lime or permanganate of potash. The British do not favor the use of the latter.

Secondary cares are measures taken to allow men to perform their toilet and to wash their clothes. Indeed the French seem peculiarly concerned lest the men be not able to shave and get a hair cut. This care for the individual comfort of the soldier is a matter of detail about which both French and English officers devote an increasing amount of time and thought.

7. Care of Quarters [*F*].

The use of whitewash is apparently very extensive in the French army.

Not only are all temporary outposts, stables, barracks, etc., kept whitewashed, but elaborate methods have been devised for the preparation of screened partitions for field hospitals or barracks, which consist essentially of a linen cloth fastened on a wooden framework and whitewashed. A sanitary and translucent (but not transparent) partition is thus obtained. The whitewash is most successfully applied when there is added to it 1 to 2 grams of alum per litre, as this facilitates adhesion. Whitewashed linen mounted on framework serves many uses under front-line conditions, as for barriers, screens for privies, screens for officers' quarters, the foundation of barricades, litters, etc.

8. Cooking.

The great problem at the front is to make cook fires or to cook without producing smoke. The French mention only that they use charcoal or coke in a brazier for this purpose. These the soldier uses for cooking and heating. The French also use so-called "solidified alcohol" prepared by mixing 100 cc. of denatured alcohol with 30 grams of a special soap.

The English have now in use a travelling kitchen of the "heat retaining" type. This consists of heat insulated ovens and compartments arranged around a central furnace, the whole mounted on two wheels. It is drawn by two horses, weighs 2,400 lbs., and cooks for 250 men and officers. Before starting the march the food is placed in the ovens, etc., the fire is lighted and vigorously stoked for over an hour. On starting the march the fire is drawn or damped. Cooking proceeds in the insulated compartments during the march.

9. Diseases of Armies [*F*].

Typhoid.—The prevention of this former scourge of armies by compulsory vaccination with anti-typhoid vaccine is so well understood and so successfully practised in the United States Army that few data are needed here. The British have used two injections at ten-day intervals, one of 500 million dead bacilli and the second of 1,000 million. The French have found that two injections does not always protect, and use four injections at intervals of seven to ten days. The numbers of bacteria per cc. used in the French vaccines is not stated, but the first dose comprises ½ cc. of vaccine, the second 1 cc., the third 1.5 cc. and the fourth 2.0 to 2.5 cc. Only men in good health are inoculated, and they are given one day off duty following each injection. The French give a .5 centigram aspirin tablet one to two hours after the injection. If local reaction is excessive the English give 30 grains of chloride of calcium (or 15 grains calcium lactate) just before and six hours after the inoculation.

Diarrhea and Dysentery.—The predisposing conditions in the present war are said by the French to be: the long stationing of large numbers of troops in the same place with consequent severe infection of the ground and water; the diet having too much meat, or, in summer, the ingestion of too many green vegetables by men who

are careless of their alimentary hygiene; the cooling of the stomach consequent upon careless removal of the flannel belt or from lying on damp ground; and sometimes also the ghastly conditions in the trenches.

The expressions "diarrhea of the trenches" and "dysentery" are used loosely to cover many intestinal infections, from typhoid, or more often paratyphoid, through gastric diarrhea, enteritis and hemorrhoids, to true dysentery. Only bacteriological examination makes differentiation certain. and such examination should always be made if possible, that proper measures of control of the infection may be taken. The chief precaution is to thoroughly disinfect all discharges from patients having diarrheal affections.

Trench Jaundice.—This is one of several names given to an apparently new disease which is rife in the trenches. "It is characterized by sudden onset of malaise, intense muscular pain, high fever for several days, followed by jaundice, and is frequently accompanied by subcutaneous hemorrhages and other complications." It is claimed that Dr. Noguchi of the Rockefeller Institute has demonstrated the germ of this disease in rats, both those infesting the trenches and those at some distance from them, and that he attributes the spread of the disease in some way to the presence of rats carrying the germ.

Cholera.—This disease is endemic in certain regions controlled by the Central Powers and precautions must be taken by advancing Allied troops. All prisoners are subjected to careful scrutiny, and if suspected, to bacteriological examinations and isolation. General precautions are those of sanitation of the trenches and disinfection of excreta in latrines, trenches or elsewhere. A careful diet, free from fruits and uncooked vegetables, with sterilized water, are additional safeguards and prophylactic measures. The Germans have successfully used anticholera vaccination in the present war, and the French are about to adopt it in suspected regions.

Typhus.—This disease being spread by the body louse or tick, the following measures for its suppression are in use by the French:

1. Disinfection of cantonments abandoned by the enemy, and medical supervision of prisoners for suspected cases. The disease is rife in both the German and Austrian armies, and as troops are transferred from place to place, the utmost care is necessary to prevent its introduction.

2. Community measures. Inspection of premises and personal effects of the soldiers; installation of stations for disinfecting clothing of vermin; installation of shower baths.

3. Precautions for suspects. Caresul delousing of hair and clothes by fpecial contrivances; isolation of the suspect or patient; enforcing absolute asepsis by means of special clothing, etc., on all the medical personnel; general sanitary precautions to isolate the buildings containing suspects and patients.

Removal of lice from head is effected by an ointment of kerosene and olive oil, equal parts, rubbed on head and washed off in 24 hours, also ben-

zene, kerosene, or 10 per cent. acetic acid alone are effective. Lice in clothing are removed best by powders, one of which is of 2 per cent. iodoform and creosote and 96 per cent. naphthaline. The young are destroyed by smearing seams with a grease of mineral oil 9 parts, soft soap 5 parts to water 1 part. Steaming or heat treatment is also efficacious.

Directly contagious diseases, as measles, scarlet fever, diphtheria, cerebro-spinal meningitis have all been prevalent in the armies in the field. Protective measures are diagnosis, isolation, removal of the patients and disinfection of premises.

Venereal Diseases.—An increase in these diseases has been noted during the war. Infection occurs not at the front, or at the temporary halting places, but in soldiers on leave in the Interior and at the Depots. Clandestine prostitution is held to be responsible, combined with the letting down of the soldiers' moral tone with relief from trench warfare and the knowledge that he soon must return to it. Active measures of education by doctors under the auspices of the Academy have been inaugurated. Meanwhile the usual measures are taken to combat these diseases in the army. The equivalent of two army corps are said to be continually incapacitated from these diseases.

10. Disinfection [*F*].

For dry antiseptics the French use chloride of lime (as a deodorant), ferric sulphate (to prevent fermentation) and quicklime (to destroy organic matter).

Formalin solutions are commonly used as body disinfectants in washing, etc. Of other antiseptic solutions only the following are considered satisfactory for field use.

Chloride of Lime.—This is prepared by adding little by little 100 grams of chloride of lime to a litre (=1 quart approx.) of water, then diluting with water to 10 times the volume. The strength of this antiseptic is considerably increased when heated. The solution attacks all metals.

Corrosive sublimate ($HgCl_2$) one to one thousand. The addition of 2 grams of sea-salt per litre (quart) adds to the efficacy by hindering the coagulation of albumen.

Heavy coal-tar oils in emulsion with water in proportion of 50 to 100 per 1,000 constitutes primarily deodorants and is especially valuable in the urinals.

Disinfection by steam or liquids is made of all bed clothing and linen after use by a patient, even though the patient has the same disease. This is done to prevent secondary infection as from broncho-pneumonia, grippe, etc., when the original infection may have been measles or scarlet fever. It is interesting to note in this connection that the French recognize broncho-pneumonia as a contagious disease.

For sterilization of dejecta, prolonged contact with 5 per cent. solutions of copper sulphate, 2 per cent. or 3 per cent. creosol, or 4 per cent. chloride of lime is used.

The British use for field disinfection a portable Thresh steam disinfector—capable of sterilizing 60 blankets at 100° C. The standard disinfectant used in the field is Liquor Cresoli

Saponatus, having a carbolic coefficient of 12. It forms a stable emulsion and is used in proportion of one and one-half ounces to the gallon of water. Carbolic acid and formalin are also used in proportion of eight ounces of either per gallon of water.

Disinfection by formaldehyde and sulphur dioxide is widely practiced. The processes are similar to those used in the United States and will not be described. In these ways disinfection is made of all hospital wards after contagious cases, including rooms, halls, vestibules, etc.; also of ambulances which have carried contagious cases.

For disinfection in the dry, use is made of either of the following arrangements:

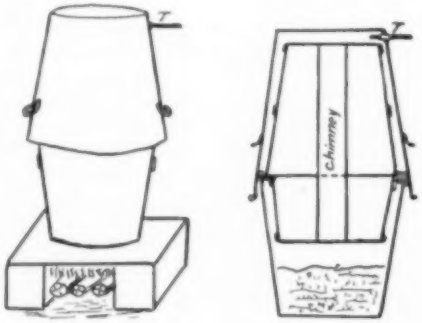


Figure 2

The first (Figure 2) consists merely of two conical parts, one inverted over the other. A closed chimney passes through the center and a thermometer opening is left at the top. The clothing or other things to be sterilized are placed around the chimney and a temperature over 100° C. is attained. The temperature recorded by the thermometer, however, is not that which obtains in the interior of the cones and it would be better to insert it half-way down the cone.

A more elaborate arrangement (Figure 3) is that of Doctor Bordas,

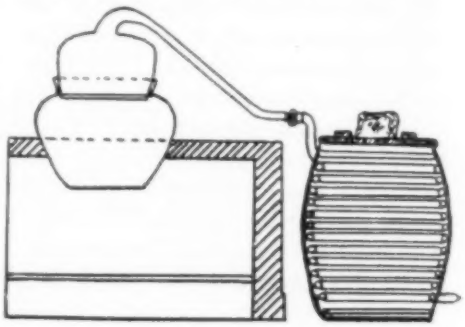


Figure 3

consisting of a retort filled with water. The steam generated passes through spiral lead pipes coiled about the inside of a wooden cask. Material to be sterilized is placed in the inside around a cylindrical log of wood which is stuck up through the center. When ready for use the log is withdrawn, the cover made tight and steam turned on. Temperatures of 106 to 108° C. are attained.

11. Excreta Disposal.

In General.—For more or less temporary encampments the shallow straddle trench has found favor both with French and British. These are essentially as used in this country on maneuvers. It is specifically stated by the English that dirt should be heaped on both sides of the trench to force the men to straddle. Otherwise the ground nearby becomes foul with

urine and the men stand farther and farther away from the trench.

The English have now come to use soakage-pits for urine. The pit, a three-foot cube, is excavated, and the soil at the bottom is loosened. The pit is filled to nearly the top with graded stones. When a suitable height is reached funnels are inserted in each corner at a convenient height. In this way fouling of the surface is eliminated and access of flies to the urine is prevented.

In the Trenches.—Here the safe disposal of excreta is a great problem. Space is at a premium, and the frequent digging of shallow straddle pits often impossible. The French excavate a deep pit, well behind the trench line. The pit is constructed parallel to the trench line and space is left for additional pits as shown dotted in the diagram, Figure 4. The communication is by means of a lateral trench some fifty feet long at right angles to the main trench. The passage way must slope *from* the main trench to prevent flooding of the latter with excrement in case of heavy rains. The pit is dug to a depth of two and one-half or three metres (8–10 feet). Around the pit is constructed a firm platform, with well-defined places for the hands and feet of men using it, and triangular openings. When the pit is three-quarters full, it is covered with brush, some coal tar deodorant is put in, and another pit is dug in front. After use the men should be instructed to throw dry earth on the dejecta. Three times a day some disinfecting and deodorizing substance should be thrown in.

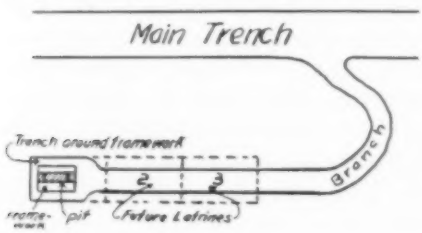


Figure 4

The French also—under some conditions—provide troughs in which liquid disinfectant is kept. The excreta are deposited here, and kept until disinfecting action has progressed to a point where they may be dumped in a pit without offense.

The English have not found pits to work well in the trenches, due to frequent flooding. They therefore place buckets in bomb-proof dug-outs. The buckets are removed by the relieved troops, who bury the contents and bring the buckets with them on their return.

An unofficial method of disposal is said to have consisted in placing excreta in empty tins and tossing them into nearby enemy trenches. Reprisals in kind, however, were so unpleasant that the practice was abandoned by mutual consent.

In Camp.—The British have found that in all cases urine is best disposed of by soakage-pits. Feces can well and economically be disposed of by incineration if the following two points are observed, viz.: (a) the proper amount of absorbent refuse, and (b) the proper type of closed incinerator.

[*B*] "A battalion of standard strength of 1,000 men provides 600 lbs. of filth a day in the latrine buckets, 500

lbs. of this being liquid and 100 lbs. solid. Normally this is collected in 10 buckets of 60 lbs. each. The fluid in one such bucket is absorbed by 10 lbs. of sawdust, and the regiment thus needs 100 lbs. per day of absorbent matrix of the equivalent value of sawdust, to take up the liquid. . . . Since the total combustible refuse from a standard unit averages 1,500 lbs. per day, the unit should be practically self supporting in its incineration." Stable litter can always be incinerated.

12. Exhumations [*F*].

The French permit exhumations *only* on demand of the public authorities, and for hygienic reasons, as nearness to water sources, wells, or habitations. Exhumations ought always to be performed in cool weather when there are no flies. Before raising the last bit of earth over the corpse, it should be wet down with some antiseptic substance, as creosol or phenol. Occasionally the ditch is filled with water, and the corpses washed there. The exhumed bodies, having been identified, are immediately placed in light coffins and sealed by some bituminous covering. The bodies are then transported rapidly to the cemetery, where new graves should already have been prepared. These are well disinfected with quicklime. Those engaged in the work of exhumation and removal should be protected by rubber boots and gloves, and masks if necessary.

13. Flies.

Both French and British have taken energetic measures to prevent breeding of flies. The procedures are those commonly used, as destruction by poisons and fly-paper, larvacides, incineration of refuse, fly-proofing of quarters and protection of foods.

14. Garbage.

In all the foreign armies, incineration seems to be the accepted means of disposal. The open pit is commonly used in the field. As the methods are similar to those used in the United States Army no comment is made here.

15. Personal Hygiene.

The general measures for the practice of personal hygiene among officers and men is so well understood that mention is made here only of several special points which have been brought out by the present war.

[*F*] *Protection from Cold and Frost-bite.*—Probably the greatest inconvenience and suffering in the trenches, not due to wounds by the enemy, have been caused by cold and frost-bite. These troubles begin by obstruction of sight, difficulty in speaking, feeling of fatigue, rigidity of muscles of the head and neck, weak pulse, finally suffocation and death. Occasionally men fall over suddenly and die.

Prophylaxis consists in abundant nourishment, with foods rich in fats, warm drinks and tonics, as tea, coffee, warm sweet wine. Alcohol (as whiskey) should not be given in the smallest dose. Clothing is important, and it is better to put on additional light impermeable clothing, than to wear heavy clothing in smaller quantity as the latter constricts the muscles and circulation. When on guard it has

been found possible to practically button up two men in an impermeable coat of rubber, or some similar substance, the men keeping warm by their own bodily heat which cannot escape.

Treatment of general stroke from cold is to take the patient to a *cool* room (never near a fire), lay him on straw, open the windows, undress him, and rub him vigorously with snow or a wet cloth. Practice artificial respiration, inject diffusible stimulants as ether or oil of camphor. When the patient shows signs of returning consciousness, give a rubbing with alcohol, shut the windows, then administer a warm and slightly alcoholic drink.

To protect the hands from the extreme cold of the trenches gloves, even when lined with fur, are not sufficient. Thick woolen mittens, with place for thumb and forefinger (for use on gun) separate, are best. Then the forefinger can be pulled back and warmed by contact with the other fingers when not in use. Very severe sores, often ulcerating and exhibiting gangrene, may occur from neglected frost-bites. Above all frozen hands or feet *should be kept away from the fire.*

Probably the greatest inconvenience in the trenches has been from frost-bite on the legs and feet. Both English and French armies have suffered severely and lost the equivalent of regiments of men from this cause alone. The term "frost-bite" is really a misnomer, as continued exposure of the affected part to cold water is the chief cause rather than actual freezing. So severe are these "frost-bites" that the loss of a leg or the enforced amputation of a foot are not at all infrequent.

To prevent frost-bite the following should be observed: avoidance of tight puttees; large, roomy, well-greased boots; two extra pairs of boots, two pairs of woolen socks frequently changed, felt or paper lining for boots, and, best of all, dry trenches. The British claim that the essential factor in "frost-bite" is prolonged contact with cold water, and that "superficial areas of gangrene are produced by the mechanical obstruction to surface circulation by imbibition of water by the skin during long standing in trenches."

Personal Cleanliness.—In theory at least the French insist much more strongly than the British upon the cleanliness of the soldier. More than once a day he is required to wash hands and feet, clean nails and comb hair. Mouth and teeth are washed, in the absence of a brush, with a soap solution and then rinsed. There should be a daily bath (see under Baths) or, lacking this, those parts of the body subjected to chafing on the march should be carefully washed. At least every week the men are required to take a shower bath. The soldier is also required to frequently wash his clothing.

For clothing the soldier should wear woolen undershirt and drawers, heavy if in cold weather, light if in warm, but always woolen. The shirt should be long enough to double up at the bottom over the stomach, as, according to the French, it is efficacious in preventing digestive troubles and diarrhea caused by cooling of the stomach. At least once a week underclothing should be washed. Where washing is being done, either a constant flow of water or frequent sterilization should

be secured. To wash without shrinkage, blankets should be dipped rapidly in boiling water, rapidly washed in warm water, and rapidly dried without wringing.

The care of the feet is of first importance, and every regiment should have at least one expert chiropodist. Boots must be large enough to wear in them two pairs of socks, that nearest the skin being woolen. Boots should be oiled every night inside and out (castor or cod-liver oil is satisfactory) and two pairs are advisable if possible. Socks should be clean each morning, or if this is not practicable, they should be aired and turned inside out. When at a halt it is well to unlace or take off the boots. The French find a leather strap, outside the shoe, brought once around the lower part of the ankle, thence under the instep and buckled just on top of the instep (a figure 8 around the instep) to be of great help in easing the foot while marching. All blisters should be pricked at the end of the day, and they, together with any sores, painted with tincture of iodine [*B*] or a commercial formalin solution [*F*]. For corns, daily bathing in a solution of salicylic acid (60 grains), extract Cannabis Indica (8 grains) and flexile collodium (1 ounce) renders them hard and opaque, and in a few days they can be removed.

Water on the March.—This is a very important consideration, as too much or too little water are alike disastrous to the soldier's efficiency. The British consider that the normal average requirements are that the men should get one quart of water at the end of every seven and a half miles marched. The ordinary day's march is 15 miles, hence one refilling of the water bottles will be necessary. To prevent continual pulling at water bottles the men should be given plenty of well-sweetened tea or coffee before starting, and should be encouraged to chew on something (a bullet, pebble, etc.) during the march, as this keeps the mouth closed and hence moist.

16. Rations.

English.—The standard English rations are tabulated below:

	Field Ration.	Reserve Ration.
Protein	175 grams	180 grams
Fat	218 grams	80 grams
Carbohydrates	515 grams	326 grams
Calories	4,855	2,800

Fat has weight for weight, two and one-half times the caloric value of either carbohydrate or protein and should in cold weather be increased at the expense of the carbohydrate.

Sugar is, of course, the most readily oxidized muscle food available. Chocolate, which used to be given to increase the sugar ration, has been found too concentrated a food to be easily digested, and has the further objection of increasing thirst. At present jam, containing 50 per cent. sugar, is given when it is desired to increase the sugar ration.

The British believe in the limited and guarded use of rum in the ration. Two and one-half ounces per man per day are provided at the discretion of the medical officer. The author quoted advises the use of rum when alternative carbohydrates or appetizers as cocoa or soup are not available. It

should only be given in specified amount, at the end of day with main meal and just before men can turn in for their night's sleep.

The standard "tinned ration" of meat and vegetables all stewed together in one tin is recommended to be served at least once a week, as the men are fond of the variety and appetizing flavor.

Fresh meat is best assimilated by use of stew, and the importance of variety in fare cannot well be overestimated.

French.—The French standard field ration gives a caloric value of 3,064, while that of the English is 4,855 (see above), that of the Russians 4,190 and that of the Germans only 2,801. The latter is considered inadequate and must have been supplemented considerably during the present war. The "Practique de l'Hygiene" does not give the calorific values of the several constituents of the ration, but goes in great detail into the weight (in kilograms) of nearly every element to be found in the daily ration. Detailed rules are also laid down for the examination of meat, both on the hoof and after slaughtering. These are rarely found in such books and hence are of value, for the medical officer should have some information regarding all methods of food inspection.

There seems some question as to the propriety, in a book of this nature, of detailed directions for preparing food to be eaten. Thus the proper ingredients for a palatable bouillon are said to be 1 pound of meat, 1 litre of water and 10 grams of salt, the whole brought to a boil and allowed to simmer for four hours. Such directions, running the whole gamut of culinary art, would seem more properly placed in a manual for field cooks, and are too often found in so-called manuals of sanitation.

17. Rats.

Destruction of rats is important in combatting bubonic plague which is carried by the rat flea. The safest poison is phosphorus, made up in 4 per cent. tablets, and sulphur dioxide is effective if it can be concentrated and confined. The French also use both a virus which is ingested by the rats eating treated food, and a toxic extract which is said to be efficacious. The French phosphoric paste is made by mixing 750 grams of flour with 750 grams of water and adding 8 grams of white phosphorus. To the mixture is added 150 to 200 grams of cheese paste and 100 grams of powdered sugar.

18. Stretchers [*F*].

Considerable attention is paid to the design and construction of stretchers. Perhaps the most important point is that stretchers must not be made too cumbersome to navigate trenches and that turns and intersections of trenches must be widened to allow passage of stretchers. See Figures 5 and 6.

19. Vermin [*B*].

The destruction of vermin of various kinds has been treated elsewhere, but it is thought the details of the British method of freeing soldiers from vermin may be of value.

Men are taken in batches, shed their clothing, and pass into a room where there are vats of hot water. The

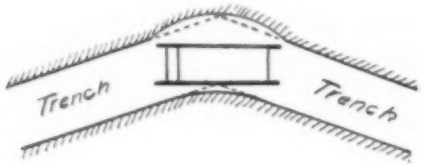


Figure 5

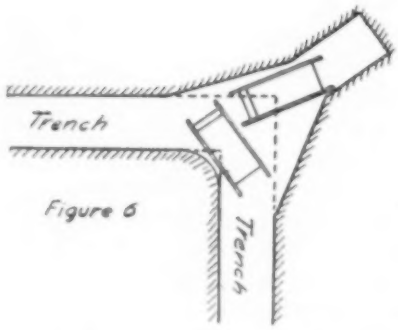


Figure 6

underclothing is removed and put into tubs of strong disinfectant while the men, ten at a time, get into the vats, and wash themselves thoroughly with soap. As water is at a premium, two lots of men use the same water which is thoroughly chlorinated between batches. On emerging from the bath the men rub themselves with lysol soft soap lather, then get rapidly into clean underclothing left by previously treated regiments and which have been sterilized and washed. While the men bathe, an army of women in an adjacent room are ironing the inner seams of the men's outer clothing, into which some lather has been rubbed. The men then dress themselves and march out. Where necessary the heads are washed in a mixture of kerosene and olive oil and the hair clipped.

20. Voluntary Infection [*F*].

The French note that cases are not infrequent where soldiers, in order to escape their military obligations, will voluntarily expose themselves to infection, or, being ill with one disease, will attempt to contract another. Such cases are treated summarily by court martial as deserters or for insubordination. Maladies which are commonly provoked or simulated are:

1. Simulation of jaundice by ingestion of picric acid. Typical jaundice color and reactions are produced. Diagnosis is made by examination of urine for traces of picric acid. Simple examination is made by neutralizing 10 cc. of urine, then making alkaline with one drop of 10 per cent. caustic soda. Add five drops of 10 per cent. cyanide of potassium and on warming a red color appears if picric acid is present.

2. Provoked Conjunctivitis. This is attained by means of irritating powders as tobacco, ipecac, tartaric or boric acid introduced under the eyelid. The soldier explains his ailment by exposure to cold, irritating gas, etc. Diagnosis is only made by examination of his effects and discovery of ipecac, boric or tartaric acid.

3. Simulated Erysipelas. This is accomplished by rubbing the face with some irritating salve. Diagnosis is made by absence of fever and systemic reactions.

4. Provoked Abscess. This is effected by subcutaneous injections of kerosene, gasoline or turpentine. Diagnosis is by noting sterile character of pus, odor of the injected substance,

and chemical analysis of pus. Examination of the suspects' belongings brings to light the responsible agent.

5. Simulated Itch. Produced by pricking the spaces between the fingers with a needle and rubbing with salt. There are other simulated affections, but those given above are in greatest favor.

6. Venereal Disease. As has been stated elsewhere, there has been a very considerable increase in the frequency of venereal disease among the soldiers during the progress of the war. Some part of this increase has been attributed to voluntary infection by men who wish to get themselves invalided away from the trenches.

Men also sometimes refuse treatment or operation in the hope of prolonging their illness. Such cases must be treated according to the law of the land and as severely as possible. In addition soldiers may voluntarily wound themselves, either by shooting themselves in the hand or foot with captured weapons or even their own, or by voluntarily producing "accidental wounds" from machines, tools, gun mechanism, etc.

21. Water Supply.

Both the French and British manuals devote considerable space to the investigation of sources, supply, and purification of drinking water. That which is presented below gives the more important or novel features from both sources, that from the French being prefixed by a bracketed *F* and that from the British by a bracketed *B*.

[*F*] It is recognized that physical character of water is not an index of its purity, and that in judging of the purity of a water the following facts should be noted:

(a) Physical character (odor, taste, turbidity, etc.);

(b) Conditions under which it is received, collected, and distributed;

(c) Knowledge of the geologic character of the region both above and below ground. Regions of limestone or fissured rocks are always suspected;

(d) Chemical and bacteriological examination.

All waters which are not, or cannot from lack of facilities, be given a clean bill of health by a laboratory analysis, are suspected and are sterilized until proven pure. The French standards are give in Table I. In general they are lower than American standards.

[*B*] Bacterial and chemical examination in the field has been unheard of until the present war, but now motor laboratories are provided in which routine examination may be carried on. These complete laboratories are not sufficient to meet all needs and for reconnaisance portable boxes have been devised, containing necessary equipment to determine total number of organisms and minimum amount containing lactose-fractors for 16 samples per day. Eight test tubes are provided for each water—one of agar for the total count and seven of McConkey's taurocholate-lactose-litmus broth in amounts ranging from 0.5 cc. to 20 cc. The box contains also necessary incubator and sterilizer. All accessories and materials for examination of 500 samples are carried in another box. The total weight is little over 100 lbs.

TABLE I.

SIGNIFICANCE OF VARIATIONS IN COMPOSITION OF WATER.

(In p. p. m.)

	Very pure water.	Potable water.	Suspected water.	Bad water.
Total permanent hardness	5–15	15–30	>30	>100
Hardness after ½ hr. boiling	2–5	5–12	12–18	over 20
Saline residue (after 4 hours hours @ 110°C.)	<150	<400	400–700	>700
Chlorides as NaCl	<27	<66	85–165	>165
Chlorides as chlorine	<15	<40	50–100	>100
Sulphate as anhydrous $CaSo_4$	3–8	8–50	50–75	>85
Organic materials (as oxygen consumed by permanganate per million parts alkalinity)	1	2	3–4	>4
Nitrates	0	0–15	15–30	30
Nitrites	0	0	trace	appreciable quantity
Albuminoid ammonia	0	.05–0.10	0.11–0.15	>0.15
Bacteria	0–100 per cc.	100–1,000	1,000–10,000	>10,000
B. coli	0	1–10 per litre	10–50 per litre	>50 per litre

<=less than >=greater than.

and examination of 16 waters per day is possible. Table II shows the results

TABLE II.

BACTERIAL EXAMINATION OF WELL WATERS IN RURAL DISTRICTS.

Class.		Total organisms per cc.	Least amount containing lactose fractors, cc.
Springs	(1)	50	39
	(2)	100	9
Wells	(1)	25	50
	(2)	70	5
	(3)	140	2.5

of examinations of 290 waters from three classes, as follows:

Class One.—Fully protected.

Class Two.—Imperfectly protected, but having no source of pollution within danger zone (taken as 30 feet or more for wells). This is better taken as 100 feet in the United States.

Class Three.—Imperfectly protected and having source of pollution within danger zone.

The whole value of this table lays in the compilation of average figures, to which a given examination may be referred and its relative degree of pollution indicated.

[*B*] *The water requirements of a military force are:*

(a) Each man requires per day the following:

In barracks	20 gals.
In standing camps, when clothing is washed	5 "
In camps, when no clothing is washed	3 "
In bivouacs, for drinking and cooking only	1 "
For drinking only, as a minimum	3 pints
During the march (of 15 miles per day)	1 gal.

(b) The daily requirements for animals are:

Horse or camel	10 gals.
Ox	8 "
Mule	6 "
Donkey	5 "
Sheep or pig	2 "

[*B*] *To estimate the yield of a well*, lower the water level rapidly by pumping; then note the time to refill. Area of well = .785 (nearly $\frac{3}{4}$) × square of diameter. Cubic contents pumped out = area × depth refilled. Cubic contents × 6.23 (nearly $6\frac{1}{4}$) = no. Imperial gallons* yield in noted time of refilling. (Express results in gals. per 24 hrs.) To find yield from streams, get surface velocity from floating chip over measured length. Take four-fifths of this as mean velocity. Multiply this by sectional area to get discharge.

[*B*] The most likely place for water in hilly districts is the base of the steeper side of a deep valley, just below where the valley bifurcates. The most likely situations in a plain are the lowest depression and points where vegetation shows greenest, or the morning mist hangs longest, or the midges are most numerous.

Not the least valuable contribution of Lelean's "Sanitation in War" is a brief sketch of the geological formations of Northeastern France and Belgium in relation to the water supply. Such information is so difficult to obtain and may be of such immense importance to American troops that the salient features are reproduced below.

The area is divided into four geological districts. A plan of these is shown in Figure 7 and sections in Figure 8. Briefly the characteristics of the districts are as follows:

Area A. The limestone on top is fissured, and the resulting springs and wells are likely to be grossly contaminated. The underlying gravel yields pure water, but often of high color due to iron and organic remains.

Area B. The gravel yields abundant water, retained by the impervious underlying clay. The chalk where outcropping on side hills, etc., is fissured and allows water to percolate so rapidly that it is useless to bore for water on the higher chalk hills. The alluvial deposits in the lowlands are water-bearing, but often contaminated by manured lands.

Area C. The surface gravels are water-bearing, but the water is often heavily polluted and must usually be purified before drinking. The sand dunes toward the coast often yield water in wells driven in the center of the dune. The yield of such wells may

* Multiply by 7.48 (or $7\frac{1}{2}$) to get United States gallons.

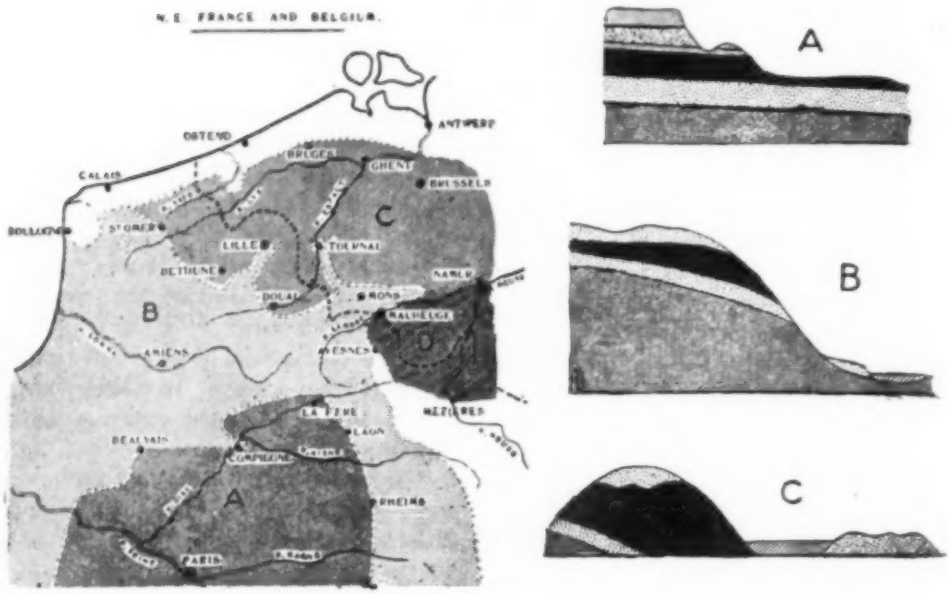


FIGURE 7

FIGURE 8

be increased by radial feeding trenches filled with stones and covered.

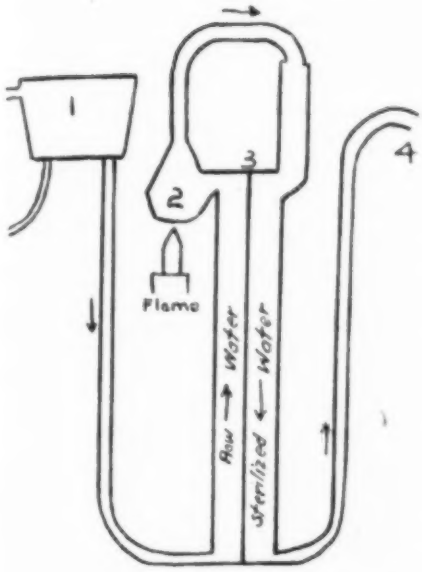
Area D. A mountainous region of limestone and chalk yielding a pure water readily obtained.

It is noted that the water supply of most Belgian towns has always been unsatisfactory and often from polluted sources. For this reason the advance of the Allied forces into Belgium is likely to lead to grave questions of water supply and purification for both civil and military populations.

22. Water Purification.

Heat.—The simplest and most efficacious method is by boiling, and this is done in all temporary encampments. It is often best to make the water into weak tea which is a better thirst quencher and more palatable than boiled water. On the march British practice is to boil the water in kettles during the night. The water bottles are then filled and hence sterilized. A second boiling provides enough for the water carts. In the morning the unit moves with bottles full and carts containing refill for bottles, all water (or tea) being cool and sterile.

The most economical means of heat sterilization is by some apparatus whereby the heat of the outgoing sterilized water is given up to the incoming raw water. An apparatus similar to the Forbes-Waterhouse sterilizer in use in the United States Army has been used by the British but has been found unreliable, since the middle compartment may leak and raw



Forbes-Waterhouse Sterilizer

Figure 9

water get into the outgoing stream without detection. The principle is shown in Figure 9.

Filtration.—In the United States Army, in large encampments of a more or less permanent nature, the Darnall filter is used. This consists of a series of containers, holding in all 20 gallons. There is siphon action, whereby the water is treated with alum and sodium carbonate (1 lb. per 500 gals.). Most of the suspended matter and a large percentage of bacteria are thus precipitated, and the water is filtered through flannelette bags. The apparatus is heavy and cumbersome, and what purification there is, is mechanical only.

Where the ground is at all adapted to filtration, the British have evolved rather elaborate means of collecting water by building a revetment parallel to a side hill contour, siphoning the water into this from a nearby stream, and filtering it. The filtered water may then be delivered under some head. See Figure 10.

The British also advocate the use of the self-washing filter cone, such as is used at Toronto. Theoretically it is most economical but no results from its use in the army are given, and it has not been satisfactory at Toronto.

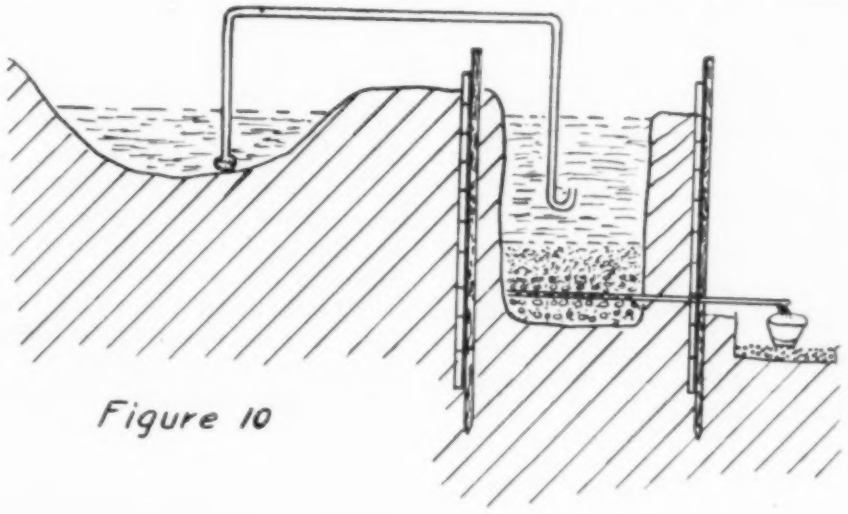


Figure 10

The British and French both use "filter candles" of porcelain or prepared material. The use is limited and results are not altogether satisfactory.

Chemical Sterilization.—When all is said and all the various suggested methods of water purification have been tried, sterilization by means of chemicals has been found most satisfactory. Of all the possible chemicals which have been used bleaching powder, or hypo-chlorite of lime has been found the most desirable, and the other chemicals largely discarded in its favor.

Hypochlorite of Lime.—To insure adequate sterilization there should be one part of available chlorine per million parts of water. To allow for probable deterioration of commercial bleaching powder, a safe amount to use is 2 grams per 110 gallons. (The British water cart holds 110 gallons.) Standard practice is to use 30 grains per 100 gallons or 8¼ pounds per million gallons. Convenient factors are that one gram = 15.43 grains, that one gallon = 70,000 grains, and that one thousand grams = 2.2 pounds.

[*B*] To determine roughly the amount of available chlorine in bleaching powder, proceed as follows:

(1) Make a thin paste from ten grains of bleaching powder and distilled water.

(2) Add one gram of potassium iodide freshly prepared.

(1) Oxidizing action. Use of a powder the base of which is permanganate of potash. Use .5 grains for 2 litres. Allow the treated water to stand 30 minutes. It should have a faint rose color.

(2) Reducing action. Accomplished by the use of a reducing agent, the active principle of which is hyposulphite of sodium. The same volume as of the oxidizing agent is used. On stirring the color becomes yellowish brown. This finally turns black and there is a precipitation of manganese dioxide with consequent clarification. The clarified water is then filtered through the Garret filter, the operation of which is evident from Figure 11.

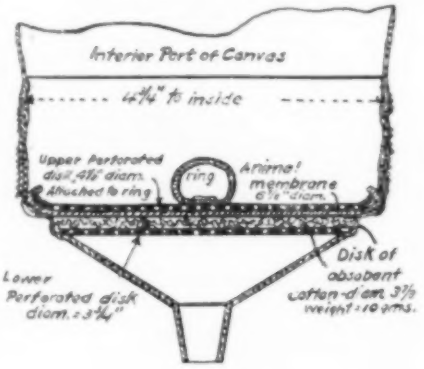

Interior Part of Canvas
4¾" to inside
Upper Perforated disk 4½" diam. Attached to ring
ring
Animal membrane 6⅞" diam.
Disk of absobent cotton-d.am. 3⅞ weight=10 grms.
Lower Perforated disk diam.=3¾"

Figure 11

Constant care to clean and sterilize the cotton filter is necessary. Otherwise the bacteria grow there and the treated water may be worse than the raw water. Used with care the apparatus is said to give excellent results, especially where both turbid and impure waters have to be handled.

The English do not advise the use of permanganate of potash alone, stating that its effect upon other than cholera organisms is uncertain, and that in addition it leaves color and taste. They do not mention its use in connection with sodium hyposulphite.

The English tendency is to use alum

for clarification, and hypochlorite for subsequent sterilization, and in this they probably accord with American opinion. It is necessary to point out that English alum is potash alum of formula

$$Al_2(SO_4)_3 + K_2SO_4 + 24\ H_2O$$
$$343 + 174 + 432 = 949$$

molecular weight, whereas American water supply alum lacks the potash. Using potash alum 5 grains of alum and 1½ grains of sodium carbonate are the amounts needed for a gallon of water—roughly a heaped tablespoonful of alum per 100 gallons and one-third as much sodium bicarbonate. The Darnall filter, mentioned above as in general use by the United States of America, utilizes similar methods.

To provide a simple, light, efficient apparatus for water purification and one easily erected, the Lister bag has been devised by the United States Army. This is a heavy canvas bag, supported on a tripod. Five spigots are set in the bottom with their ends projecting about three inches above the bottom of the bag. Five soldiers at a time can thus use the bag. The bag is suspended and filled with water, which should be clear. To the water is added in the form of a paste 1 grain of calcium hypochlorite. The chemical comes in glass tubes containing 1 gram each. The bag holds 40 gallons of water. The disadvantage of the bag is that while it sterilizes it does not clarify. The ideal arrangement is said to be the Darnall filter used in conjunction with the Lister bag.

[*B*] *Sodium Bisulphate.*—This salt provides a most useful means of sterilizing water by the use of a single tablet, and is in considerable use by the British. It affords a valuable means of sterilizing water for troops—as cavalry, which occasionally find themselves detached from their water carts. Each cavalry man should carry a bottle of tablets, and when refilling his water bottle he should add a couple of tablets and abstain from drinking for a half hour. Addition of 2 grams of the salt to the contents of an (English) water bottle gives .07 per cent. free H_2SO_4 which destroys bacteria in one half hour. The tablets are made up with oil of lemon and saccharin so that the solution tastes like lemonade. The objection is the liability to formation of soluble sulphate of toxic metals from water bottles. Nearly all alloys and metals are attacked. Aluminum water bottles should be supplied to all men using these tablets as the aluminum sulphate formed is so slight as to be of no consequence.

Chlorine Gas.—The use of liquid chlorine and the production therefrom of chlorine gas has come to have a widespread and satisfactory use in the United States. It seems probable that this method of sterilization will supplant older methods for permanent or semi-permanent encampments, at least in this country.

SUGGESTIONS CONCERNING THE PREVENTION AND CURE OF ACUTE LOBAR PNEUMONIA.

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Abstract of remarks made before the Conference of State and Provincial Boards of Health, at Washington, D. C., May 2, 1917.

IT IS unnecessary for me to tell you, who are entrusted with the health of this country, of the importance of this disease. You know the statistics better than I do. However, I should like to lay stress on one fact. By the public at large pneumonia is considered to be a disease affecting mainly the very young and the old and decrepit. As a matter of fact, over half the cases occur between the ages of 20 and 50, during the period of greatest activity. It is therefore of great economic importance, and is undoubtedly from every standpoint the most important acute infectious disease with which we have to deal.

What we all desire is to lessen its incidence and cause the number of deaths to be decreased. Can the results of the newer studies aid us in accomplishing either of these objects? A very brief review of some late observations and conceptions may be of interest from this point of view.

Probably the most important fact that has been established is that the pneumococci causing this disease are not all identical and that on the basis of their immunological differences, and to a less extent on their morphological characters, they may be divided into several groups or types. Pneumococci of Types I and II cause about 65 per cent. of the cases of pneumonia. The organisms of each of these types are immunologically quite distinct and have definite specific characters. In Type III are included the organisms which have very large capsules, form sticky exudates in animals, and are called Pneumococcus mucosus. These organisms also possess specific immunological properties. They cause pneumonia relatively infrequently, only about 10 per cent. of the cases being associated with pneumococci of this type. The remaining cases of pneumonia, about 25 per cent., are due to the organisms which have been included in Group IV. Each strain of pneumococcus of this type seems to be immunologically distinct, at least the different races possess no well-marked common immunological properties. The severity of the infection due to the organism of these various types seems to differ; at any rate, from the experience so far obtained, the mortality among the cases due to organisms of the first two groups is 25 to 35 per cent., that of the cases due to the pneumococci of the third group is much higher, 50 per cent. or more, while the cases due to organisms of the fourth group have a low mortality, 10 to 15 per cent.

Further study has indicated that

most of the pneumococci found in mouths during health belong in Group IV. Studies have now been made by Dr. Stillman and other workers in the Hospital of the Rockefeller Institute concerning the organisms isolated from the mouths of 942 normal individuals. From 450 of these individuals, 47 per cent. pneumococci were isolated. In 345 of these instances the pneumococci found belonged in Group IV or were of the so-called atypical varieties, while in only 56 instances were the organisms of Type I or Type II. Moreover, in all but three of these cases in which pneumococci of these latter types were found, there was discovered a close association between the person harboring them and a person sick with pneumonia due to the same type of organism. In this series special attention was given to the cultivation of organisms from the mouths of contacts so that it is possible that the relative number of persons found carrying these types is much larger than would be found in a series not so chosen. Efforts have also been made to discover for how long a time convalescent or healthy carriers of the types I and II pneumococci harbor these organisms. It has been found that in most cases pneumococci of these types disappear from the mouths of convalescents within a few weeks after the patients leave the hospital, though in a few instances they have persisted for a longer time, the longest time so far observed before disappearance being 83 days. Practically the same facts apply to the persistence of these types of pneumococci in the mouths of healthy carriers.

Attention also has been given to the cultivation of pneumococci from the dust of houses where patients with pneumonia were present or had been present, and also dust from houses where there had been no known cases of pneumonia. One hundred and seventy-five specimens of dust from houses where there had been present cases of pneumonia due to Type I or Type II pneumococci were studied. In 73 of these specimens of dust pneumococci were found, and in 47 instances these were of Type I or Type II, and in all these cases but two, the type of pneumococcus found in the dust corresponded in type with that isolated from the patient. On the other hand, in 62 specimens of dust obtained from houses in which no cases of pneumonia were known to exist, pneumococci were isolated 18 times, but in only one instance were pneumococci of the fixed types, I or II, present, and in this one instance a known carrier of the corresponding fixed type was found to be visiting at the time. Moreover, in two small epidemics which Doctor Stillman has had an opportunity of investigating, there was good evidence that a fixed type organism was responsible for the cases, carriers of the same type of organism were found, and the same type of organism was found in the dust.

All this evidence seems to suggest very strongly that the epidemiological factors concerned in pneumococcus infections with these fixed types I and II are the same in principle, though differing in degree, from those concerned in other infectious diseases. In other words, it seems probable

that, so far as infections with these fixed types are concerned, infection from one case to another occurs either fairly directly or through the intermediation of healthy carriers. These healthy carriers, while probably larger in number than occur in other infectious diseases, are not extremely numerous, and moreover, as we have shown, are only temporarily carriers of these organisms. So far as infections with Group IV organisms are concerned, we have no evidence as yet to prove that infection may not be due to the same organism commonly carried in the normal mouth. In this form, the infection may be truly autogenous, as was formerly thought to be the case with all forms of pneumococcus infection.

The weak point in our views regarding infection with Type I and Type II pneumococci is afforded by the confusing results of the observations regarding Type III infections. Here we are dealing with the most severe type of pneumonia, though it occurs only relatively infrequently. Nevertheless among the 450 healthy carriers of pneumococci, pneumococci of this type were found 85 times, and in practically none of these persons could any association with cases of pneumonia due to the same type of organism be discovered. Moreover, it has been found that these healthy persons may carry such pneumococci for very long periods of time, even years. Also, so far as we have as yet been able to discover, these Type III pneumococci found in normal mouths differ in no way, immunological or otherwise, from those found in disease.

These facts render the whole matter still somewhat confusing, but it seems, nevertheless, that the facts found concerning Type I and Type II infection strongly suggest contagion and are sufficient to justify the introduction of some measures of isolation.

Preventive inoculation.—It does not seem that at present, in civil life at least, the method of preventive inoculation would offer a practical prophylactic measure. This measure has been carried out in native mine workers in South Africa to a considerable extent, not, however, with proper attention to prevailing types of infecting organism. The results have been very inconclusive. Lister, however, has again taken up the matter, studying the types of organism concerned and has found that the predominating type of pneumococcus found in cases of pneumonia occurring in South Africa differs from those found here, although the types prevailing here are also found there. He has made studies on himself and on a limited number of individuals concerning preventive inoculation, using the specific type organisms and has brought forward strong evidence to indicate that properly carried out preventive inoculation may be effective in preventing the occurrence of the disease due to the type of organism used for inoculation. It seems possible, therefore, that where very large numbers of cases occur among groups of individuals as in South Africa, or among troops, preventive inoculation might be tried with considerable hope of success. As before stated, however, it does not seem practical at present among ordinary civilian populations.

Serum treatment.—Lastly, is specific serum treatment of value in preventing the high mortality from this disease? For the past six years we have been carrying on studies dealing with this problem in the Hospital of the Rockefeller Institute. Since specific immunological differences of type have been shown to exist, we can only hope to obtain results from the use of serum, the action of which is known to be highly specific, when we employ in the individual case a serum which is effective against the specific type of organism causing the infection. In order to carry out this form of treatment, therefore, it was first necessary to devise a diagnostic method for determining in every individual case the type of organism causing the infection. This has now been done, using the patient's sputum for this purpose, and obtaining the organism in fairly pure condition by injecting some of the sputum into the peritoneal cavity of a mouse. I cannot go into the details of this method, here, but it is sufficient to say that while complicated, it is still sufficiently simple to be carried out as a routine measure in any well equipped laboratory. Recent studies have shown that in about a third of the cases an exceedingly simple urine test is sufficient for diagnosis. In the remaining cases, however, this method at present gives no information. Having in our possession a diagnostic method, it has now been possible to test the serum treatment in a considerable number of cases. A serum of very high protective power when tested experimentally in animals has now been obtained against pneumococci of Type I. It has so far only been possible to obtain a serum of considerably less power against organisms of Type II, and a serum having only very slight protective power against organisms of Type III has been prepared. Manifestly it is impossible to prepare a serum against all the pneumococci of Group IV. Owing to its slight protective action, it has not been thought justifiable to try the Type III serum in the treatment of human patients. Some trial has been made of Type II serum, but the results have not been very striking and further studies are being made in the hope of improving its quality. On the other hand, the clinical results from the use of Type I serum have been most satisfactory and very encouraging. Since cases of this type constitute one third of all cases of pneumonia, it would seem that favorable results obtained in this one type would justify its general employment in an effort to lower the mortality, and it would seem that the practical use of this form of therapy at present should be confined to this one type. In the Hospital of the Rockefeller Institute, 103 cases of this type have now been treated with but 8 deaths. Among the 33 cases treated during the present winter but 1 patient has died. The serum has also been used in a limited number of patients at the Peter Bent Brigham Hospital at Boston and the Presbyterian Hospital, New York, with very encouraging results, and it has been used in a considerable number of soldiers on the Texas border, with very great success.

Routine determinations of type of

infecting organism are now being made in a large number of hospitals, and the New York City and State Health departments are now prepared to determine the type of pneumococcus present in specimens of sputum sent to them for examination. These health departments and the Philadelphia City Health Department are also now manufacturing serum for distribution in their various localities.

Practical measures to be instituted by health departments.—I realize that it is somewhat presumptuous in me and that I am somewhat overstepping my proper field when I venture to suggest the practical measures which may be undertaken with some promise of success. However, I have already seen some of the difficulties and some of the pitfalls which have lain in the way of misdirected efforts, and I therefore venture to offer a few suggestions.

First, it would seem that a very important preliminary step in prevention is to make the disease reportable. The importance of this measure has been so well demonstrated as regards other infectious diseases, especially tuberculosis, that I need do no more than mention it here.

Second, it seems that we have sufficient evidence concerning the direct transference of infection in the cases due to the fixed type organisms to justify recommendations as to limited isolation of patients, sterilization of sputum, etc., and thorough cleaning of rooms in which pneumonia patients have been present, at least with soap and water. It would seem to be a proper function of health departments to extend and develop the observations which have been made regarding mode of infection. At least epidemics should be studied, and any cases of apparent direct transfer be investigated. Proper laboratory organization is necessary to do this, and I therefore suggest,

Third, that the department laboratory should be so organized or extended that determination of type of pneumococci can be accurately and rapidly made. Such determination will be of great statistical value, and where it can be done on a considerable scale for physicians, I believe it will stimulate them very much in the care and proper observation of their patients as well as be of great value in prognosis. The extent to which this work is developed will have to depend on local conditions. It is important, I believe, to limit this work at first.

Fourth, and finally, after these steps have been well organized, and only then, the health department may take up the matter of treatment of cases of Type I with an appropriate serum. When this is undertaken it is of very great importance that the laboratory be so organized that as little time as possible elapse between the collection of the sputum and the administration of serum. The earlier in the disease any form of serum therapy is instituted, the better, and this is especially true of this form of serum treatment. If sputum be sent by mail, probably remaining in the office 12 to 24 hours before reaching the laboratory, then if, arriving late in the afternoon, another 12 hours elapse before the mouse is injected, and finally the diagnosis is sent by mail, and 12 to 24 hours

again elapse before the reply is received by the physician, either the patient will be well or dead before the diagnosis is obtained, or he will be so badly infected that no amount of serum will save him.

Another important point, at first at least, is that the administration of serum be made under the personal direction of a physician from the health department, who is especially trained for the work and has full knowledge concerning serum reactions. Only by this method can results be obtained which will be of value in making up your minds as to the value of the serum. I realize that all this makes the method complicated. It is complicated, but unless it can be carried out so as to obtain results, a health department is not justified in undertaking the work. Otherwise the money used will only be wasted.

Whether a health department shall undertake the manufacture of the serum used must rest largely on its policy in regard to the manufacture of other sera. Large amounts of serum are necessary. The average amount of serum per case, in our experience has been 250 cc. Horses cannot be bled so frequently as in the manufacture of diphtheria antitoxin or even in the manufacture of anti-meningococcus serum. Its manufacture is therefore expensive. If a department does not manufacture its own serum, however, but purchases from a commercial house, very great care must be taken that the serum obtained be of high potency. At present there is no established standard, but a satisfactory method of standardization has been worked out and steps have already been undertaken by Doctor McCoy, Director of the Hygienic Laboratory, toward officially establishing such a standard. When this is done the matter will be greatly simplified.

In conclusion I wish to thank you for your very kind attention and to express my appreciation of the interest you have shown in this matter. I realize that only a beginning has been made in this very important matter of preventing the great loss due to pneumonia. You will have to finally decide whether the paths along which we have started will lead to practical results. If the direction we have taken is not the correct one, we look to you to set us right.

DISCUSSION.

Dr. A. J. McLaughlin, *Massachusetts*. Mr. President, I feel sure that the Conference is under great obligation to Doctor Cole for the presentation this morning of this subject in such a practical manner, and for showing us the practical things we can do now, and as I said yesterday, we are practically following out what he has suggested. The state laboratory, and possibly the branch laboratories at Springfield, Worcester, New Bedford and other large cities, within two months will be equipped to make diagnoses. It is planned to divide the state into 23 districts, in each of which there will be a competent serologist for polio work and this same man can be trained to do the necessary work on Type I pneumococcus infections.

In regard to the administration of Type I serum, Doctor Rankin made an interesting suggestion and that was that we give the serum in all cases of pneumonia first, and then for statistical purposes determine the type by laboratory methods, and subtract all cases which

were not Type I. This would give an exact statistical record and also give some advantage in getting an early administration of the serum.

In Massachusetts we have, conservatively speaking, about 1,000 deaths each year due to Type I pneumonia, and if we can reduce this number, it will be a great thing. Of course it will depend upon how the serum is taken up by the physicians, but I think as Doctor Cole does, that it should be handled carefully through competent men.

DR. E. R. KELLEY, *Massachusetts*. I would like to have your opinion as to how many diagnoses a trained laboratory assistant ought to be able to make in a day. That is a very practical question from the administrative side. There is another point, too. I wish Doctor Cole would dilate a little on the dust question. Some experiments have been made which are suggestive that we are not wrong in our view that the dust surrounding a person ill with the disease may be a source of danger for a considerable length of time.

DR. J. T. SWARTS, *Rhode Island*. What about the standardizing of the state and commercial sera?

A MEMBER. Is fumigation advised after pneumonia, and if so, what form?

DR. COLE: First, in regard to the question as to the use of serum from different places. We have tested out the commercial serum and that prepared by state laboratories. We have been in touch with the state laboratories for the last few years, and they have obtained the methods from us and those sera are now all satisfactory.

Certain commercial sera, though, are not of any use at all. Upon testing them, we found they had no antibodies for any type. I have already taken this matter up with Doctor McCoy, of the Public Health Service, and he is very much interested in it. The method most advisable is that we have a standard for this serum just as we have for antitoxin. I think under his direction this is going to work out most satisfactorily, and before long we will have a definite standard for anti-pneumococcic serum Type I.

If any of you take up the work immediately of manufacturing the serum, you should standardize it for yourself and make sure it is of value. Otherwise we will have very conflicting results.

As to fumigation, that is a matter for the health officials. We feel that a thorough washing with soap and water is very much more efficacious.

As to the number of diagnoses which any one person can make, that would depend upon how well the work is organized. We have carried the work out in a hospital where we have not tried to rush the matter through or make a great number of diagnoses.

As to the use of the serum in all cases. Personally I am very anxious to have treatment only in the cases which are due to the specific organism against which our serum is effective. That is the only way you can carry the treatment out with confidence and enthusiasm. If we feel that in three-quarters of the cases the administration of the serum will have no effect, we cannot have much enthusiasm about it. That is an important matter.

As to the persistence of the organism in dust, I cannot say. Enough observations have not been made. In one case the organism was found in the dust of a room occupied by a patient fifty-seven days after recovery, but in most cases these type organisms disappear from the dust within three or four weeks, sometimes within a few days.

DR. KELLEY: The reason I asked about the number of diagnoses a person could make in one day was that I heard an opinion expressed that the utmost a laboratory worker could do would be five or six a day.

DR. COLE: I think twenty-five a day would be a reasonable estimate. If the laboratory were well-organized, he might do more.

On motion of Dr. T. D. Tuttle, a rising vote of thanks was extended to Doctor Cole.

ALCOHOL—A PUBLIC HEALTH PROBLEM.

HAVEN EMERSON, M. D.,
Commissioner of Health, New York, N. Y.

Presented before the General Sessions of the American Public Health Association, Cincinnati, Ohio, October 24, 1916.

A NOTABLE address before the convention of Public Health Officials and the Massachusetts Association of Boards of Health, on April 29, 1915, by Dr. Charles W. Eliot included the following statements:

"The next evil which should be attacked with the utmost vigor by all boards of health is alcoholism. Public opinion needs to be enlightened on two points with regard to the use of alcohol as a beverage.

"In the first place, it should be brought home to the entire population that the habitual use of alcoholic beverages reduces, in a serious degree, the productive efficiency of the community.

"In the second place, recent experiments on the effects of alcohol on the nerves and glands of the human body have demonstrated beyond a doubt that alcohol invariably does harm, and never any good either in health or disease. The use of alcohol as a defense against exposure or fatigue has been given up by all sensible persons. . . .

"This evil is rooted, first, in what are called vested interests—that is, in the investment of large amounts of capital in the plants which produce, store, and distribute beers, wines, and spirits, and secondly, in the methods of taxation to which the white nations are accustomed. Heretofore the medical profession and the public health officers have given an uncertain sound concerning the use of alcohol. . . .

"It remains for the boards of health to attack this hideous evil with the weapons and in the spirit of preventive medicine. They should bring to the work all recent knowledge concerning the effects of alcohol on the human body, call to their aid legislators who can find equivalents for the public revenue now derived from the manufacture and sale of alcoholic drinks, and reënforce to the utmost the wise counsellors who by moral teachings have brought about during the past fifty years considerable improvements in regard to the use of alcohol in the more intelligent and conscientious classes. . . .

"The responsibility of physicians and boards of health in regard to the advice they give to young people on these matters is heavy indeed; and so is their responsibility on these subjects towards legislatures, municipal governments, courts, and state executives."

Let us, for the moment, roughly group the diseases which are at present recognized as preventable, under the following three headings:

Communicable diseases.

Diseases of occupation.

Diseases due to personal habits detrimental to health.

Does alcohol as generally used in beverages increase the incidence or severity of any one or more of these three classes of preventable diseases and deaths? If so, its use is a matter of concern to public health officers.

Alcohol causes a lowered resistance to communicable diseases, to infections, and in addition to the clinical experience generally accepted, there are certain facts which add specific evidence to the general proposition. Clinical experience is unanimous on these points, but clinical experience has not been acquired or written up in a manner to be a convincing argument for those who consider that alcohol is a detriment to the public health. It is, therefore, necessary for us to search among the laboratory evidences and the special studies, and some of them I would suggest for your consideration and use in your educational work.

Conradi* showed that there was a diminished production of antibodies in cholera, in people using alcohol freely, after a dose of protective inoculation had been given. In other words, in a given group in the community, you can accomplish a very substantial protection against cholera by protective inoculation; but if the people in the presence of and following the protective vaccination, continue the use of alcohol, they lose the benefit of antibody production which your procedure has stimulated or should stimulate in their bodies.

Laitinen† showed a diminished resistance to infection in animals after dosing with alcohol.

Pampoukis and Szeckley‡ found unfavorable results and a persistence of the virus of rabies in subjects under anti-rabic treatment if they are users of alcohol. This study extended over twenty-five years of administration of Pasteur treatment at Budapest.

Reich§ noted unmistakable lowering of body resistance to disease, indicated by a less effective phagocytosis in typhoid in man and less resistance of human red blood cells to hypotonic salt solutions in proportion to the use of alcohol. These are two valuable methods of measuring cellular resistance to disease and response to infection.

In addition to the specific lowering of resistance to infection and lowered ability to combat infection when once acquired, alcohol plays an undoubted contributing part in the acquisition and spread of venereal diseases.

As Fisher and Fisk‖ have clearly indicated and as has been proved in countless tests of physical prowess and skill under almost unlimited variation of conditions, efficiency of mind and body are decreased by the use of alcohol, or as Quensel¶ so tersely put it, "Work and alcohol do not belong together, especially when work demands wide-awakeness, attention, exactness and endurance." While such statements are easy to make, it has only been within the last two or three years that we have had exact data to

* Conradi, Jour. Am. Med. Asso., April 8, 1916, p. 1122.

† Laitinen, *Ibid.*

‡ Pampoukis and Szeckley, *Ibid.*

§ Reich, Jour. Am. Med. Asso., Mar. 25, 1916, p. 962.

‖ Fisher and Fisk, *Ibid.*

¶ Quensel, *Ibid.*

prove those precise general conclusions.

Benedict and Dodge* in their classical monograph on the psychological effects of alcohol, came to the following conclusion:

"In conjunction with pulse acceleration, the general neuro-muscular depression following the use of small amounts of alcohol may be regarded as presumptive evidence of the effect of alcohol on organic efficiency. In none of our data is there any indication of a pure facilitation effect of alcohol."

In addition to these general conclusions, these authors reached in their exact studies of the time reactions of various reflexes in people treated with small amounts of alcohol, a precise foundation for the common knowledge that alcohol increases liability to accident. To the casual observer it is apparent that this increased liability to accident is due to *delayed perception* of signs occurring in the immediate vicinity of the individual (which would, to an alert and sensitive person, indicate a warning) *followed by delayed response and decrease* in the *velocity* and *amplitude* of the necessary muscular movements which must be carried out to avoid injury.

They found that there was a delay of 10 per cent. in the patellar reflex and a diminution of 46 per cent. in those dosed with small amounts of alcohol. Similarly they discovered a 10 per cent. diminution in the lid reflex, 5 per cent. in the eye reflex, 3 per cent. in the speech reflex, 14 per cent. diminution to faradic stimulation, 9 per cent. diminution in the finger movements and 11 per cent. decrease in the velocity of the eye movements. Just note what that series of observations means. Remember that an accident occurs or is missed according to the rapidity, quality and amplitude of the neuro-muscular response. The saw, the lathe, the swinging beam of steel does or does not mutilate the careless workman, according to the reaction of a thousandth of a second upon which the self-protective mechanism depends. We used to say, explaining an accident, "The man was dull with his beer"; now we know the measure of his dullness, that the slight dose of alcoholic beverage will, with certainty, delay his response of eye, voice and hand, and he suffers accordingly.

It is not strange, therefore, that careful students observing large numbers of dispensary patients reach the conclusions which Brickley† reached at the Haymarket Relief Station in Boston, where 40,000 patients a year pass through the hands of physicians and surgeons.

Brickley summarizes the results of his studies as follows:

That alcohol causes accidents.

Obscures the diagnosis.

Increases the danger of infection at the time of accident.

Prevents adequate treatment.

Increases the danger of intercurrent complications.

Retards the process of repair.

Gives poorer end results.

* Benedict and Dodge, Jour. Am. Med. Assn., Mar. 25, 1916, p. 962.

† Brickley, Boston M. and [illegible]ur., Ma 20, 1916, p. 744.

Increases the mortality from accidents.

Increased susceptibility to specific metallic poisons occurring in volatile form or distributed by hand to mouth contact, has been demonstrated in the lead, phosphorus and aniline industries, and it is a general statement capable of exact support that where there are unfavorable industrial conditions putting a strain upon the individual worker, those who are accustomed to using alcohol steadily and not even in obviously intoxicating amounts, show a greater susceptibility to the unfavorable conditions of their environment than do those who abstain from the use of alcohol. The non-alcoholized individual comes out of his risks without the clinical manifestations of the poisoning more often than does his fellow workman who uses beer and whiskey.

Glaister* has recently reported an increase in the susceptibility to mountain sickness, shown by those mountain climbers who use alcohol in small amounts.

Ashby† in his 1915 edition concludes that there is an increase among stillbirths and an increase in the death-rate of children born alive, maintaining an almost constant relation to alcoholism in the mother. This clinical observation of the physician and public health administrator is well supported by the studies of Stockard,‡ under experimental laboratory conditions, where he was able to observe the constant degenerative results in guinea pigs, rabbits, etc., and to analyze the damaging effects of alcohol, where applied through one or both parents, and as it affected the immediate progeny and the later litters of young. Wiggelsworth§ expresses the common opinion that alcohol causes an unstable and badly developed brain and nervous system. By this we mean that the use of alcohol in the parent usually or frequently determines an unstable and badly developed brain and nervous system in the progeny, not necessarily giving us a characteristic case of what would be called an inherited or congenital disease due to alcohol, but a resultant diminished constitutional resistance in the presence of the stresses and strains of our present social order.

It is necessary only to remind this audience of the report of Hunter, based upon the records of the insurance companies here and abroad, which indicates that mortality among users of alcohol is in almost direct proportion to the amount of alcohol consumed and that financial policies and actuarial practice recognize the relationship between the use of alcohol and life insurance risks.

Without entering the field of economics or discussing the distinction between luxuries and necessities, it is easy to see that the food materials which enter into the production of alcoholic beverages lose so much food value and the amount invested in the industry is so large a tax upon the

* Glaister, Journ. Am. Med. Assn., July 2, 1916, p. 308.

† Ashby, Infant Mortality, Cambridge Public Health Series, 1915.

‡ Stockard, Proc. Soc. Exp. Biol. & Med. N. Y. 1913-4, xi, 136.

§ Wiggelsworth, Infant Mortality, Cambridge Public Health Series, 1915.

community as a whole, for the sake of producing and distributing this habit-forming drug, that the general cost of living of a country, and one might properly say of the world at large, is considerably raised by the demand for alcoholic beverages. That, perhaps, is not one of the burdens of the public health officers, but it has a decided bearing upon the economic status of the people who must depend upon their economic efficiency to meet the competition of life.

We, the public health officers of this country, must overcome the inertia of this habit in the community and offset the momentum of great industries by teaching the consumer and the producer of alcoholic beverages to discontinue their mutual conspiracy, which is robbing the future generations of their birthright of health.

What are you, as public health officers, and your staff doing now by personal example and by teaching through the spoken and written word to wean your community from a habit which is a large contributory factor in the cause of the deaths and sicknesses for the prevention of which the community employs you and trusts to your advice? I would not have it appear for a moment that I am asking you to start a campaign for legislative interference with the production of a widely used commodity; I am asking you simply to so teach the consumer, so that he will cease to demand the product. Automatically capital will flow into other sources and the momentum of the industry will be checked. We must teach the consumer not to use liquor, and I believe the public is learning the lesson. I think that there is no power in the country so great as the power of the public health officers if they speak and write to this effect in no uncertain tones, unanimously and continuously.

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RESOLUTIONS ADOPTED BY THE CONFERENCE OF STATE AND TERRITORIAL HEALTH OFFICIALS AT THE SESSIONS HELD IN WASHINGTON APRIL 30—MAY 3, 1917.

We, the Executive Health Officials of the several states and territories, in conference assembled, do hereby

Resolve, That under conditions incident to a state of war, the public health personnel, resources and organizations of the several states and territories should be placed at the disposal of the Federal Government.

Whereas, The Federal Public Health Service has hitherto been the natural point of contact between the Federal Government and the several states and territories in all matters pertaining to public health, and the aforesaid service is thoroughly familiar with the manner of administration of public health measures by State and local boards and departments of health, be it therefore

Resolved, That it is the opinion of the Executive Health Officials of the several states and territories in conference assembled, that the Federal Public Health Service, under conditions incident to a state of war, should be the agency of the Federal Government through which correlation, supervision, and direction of the various state and local health agencies should be exercised, and be it further

Resolved, That aside from the hygienic and medical care of the actual military and naval forces, all sanitary and hygienic activities incident to a state of war which require a national policy, should be correlated, supervised, and directed by the United States Public Health Service.

Whereas, The present personnel and organization of the Federal Public Health service is entirely inadequate, be it therefore

Resolved, That it is the opinion of the Executive Health Officials of the several states and territories, in conference assembled, that a National Sanitary Reserve Corps should be created as an auxiliary to the Federal Public Health Service. We, the Executive Health Officials of the several states and territories, in conference assembled, do hereby unequivocally endorse the following resolution:

JOINT RESOLUTION.

To Establish a Reserve of the Public Health Service.

Be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of securing a reserve for duty in the Public Health Service in time of national emergency, there shall be organized, under the direction of the Secretary of the Treasury, under such rules and regulations as the President shall prescribe, a Reserve of the Public Health Service. The President alone shall be authorized to appoint and commission as officers in the said reserve such citizens as, upon examination prescribed by the President, shall be found physically, mentally, and morally qualified to hold such commissions, and said commissions shall be in force for a period of five years, unless sooner terminated in the discretion of the President, but commission in said reserve shall not exempt the holder thereof from military or naval service. Said officers shall consist of Sanitarians, Passed Assistant Sanitarians, and Assistant Sanitarians: and when ordered to active duty in the service of the United States, shall receive the pay, allowances, and leaves of absence of Surgeons, Passed Assistant Surgeons, and Assistant Surgeons, respectively, provided that the Secretary of the Treasury may appoint for duty with said reserve employees in such number as the public interest may require and the funds appropriated may permit.

That for the purpose of carrying out the provisions of this act the sum of $..... be appropriated out of any money in the United States Treasury not otherwise appropriated.

Resolved, In the opinion of the executive officials of the health departments of the various states and territories, the state departments of health of the respective states and territories should assist the federal authorities in the following sanitary activities during the period of the war.

First. The sanitation of military and naval camps and camp sites.

Second. The exercise of police powers in relation to the sanitation of the environment of military and naval camps.

Third. The provision, when required, of public health laboratory facilities for the diagnosis and sanitary surveillance of infectious disease occurring among the troops.

Fourth. The provision as far as possible, when required, of hospital accommodations for the care of cases of communicable disease occurring among the troops.

Fifth. The protection of military and naval camps from the introduction of communicable diseases (including tuberculosis and venereal diseases), from the civilian population.

Sixth. The sanitation of intrastate transportation facilities.

Seventh. The investigation and exclusion from military and naval camps of disease carriers.

Eighth. The immediate reporting to the Public Health Service of epidemic foci of various infectious diseases (especially poliomyelitis, epidemic cerebrospinal meningitis, smallpox, typhus, typhoid, and paratyphoid fevers and bacillary dysentery), developing in any of the states or territories.

Ninth. The sanitary supervision of refugees and interned aliens.

Tenth. The sanitary supervision of the sources of the water, milk, and food supplies of the combatant forces.

Eleventh. The sanitary supervision of soldiers suffering from pulmonary tuberculosis, or those rejected from the army and naval forces because of this disease.

Twelfth. The sanitary supervision of migratory laborers and of industrial camps.

THE DEATH-RATE OF WASHINGTON.

W. F. Willcox,
Professor of Economics and Statistics, Cornell University, Ithaca, New York.

AT THE close of an elaborate article on "Death-rates in Old and Young States" which in the April issue of this *Journal** the State Commissioner of Health of Washington reached the following conclusions:

"First. The registration of deaths in the state of Washington is as complete as that in most, if not in any, of the states in the registration area.

"Second. The low infant mortality in Pacific coast states is an absolute fact and not a hallucination of overzealous health officers.

"Third. A mortality of less than 10.0 in a young state is entirely right and proper and when the mortality exceeds 10.0 in our young states, investigation as to the precautions taken for the preservation of the health and lives in such states is entirely in order.

"Fourth. That some method should be devised by the United States Census Bureau whereby reasonably accurate estimates of population may be made in sporadically growing states."

The first and third of these conclusions are opposed to positions which I defended in an address before the California meeting of the American Statistical Association in the summer of 1915.† At that time I said "The death records of Washington . . . are very imperfect and as a result cannot serve as a basis for studying the recent growth of population in the Pacific states" (p. 719) and in the course of my argument suggested that it might be wise for the Director of the Census in the exercise of the discretionary authority vested in him by Congress to exclude the state of Washington from the registration area on the ground that the inclusion of its incorrect and misleading returns with those of the more trustworthy figures from 22 other states tended to discredit the whole set of figures.

This conclusion regarding the little value of the Washington figures was merely introductory to my main argument. With a group of statists, also, I might venture to assume a knowledge of the elementary principles of vital statistics and a conviction that a death-rate of 8 per 1,000 in Washington might at once be rejected. For these reasons I did not amplify my argument. But now my conclusion has been challenged and the hearing transferred to a jury composed mainly of physicians, few of whom probably have been trained in vital statistics. If I were writing for statists I might try to undermine Doctor Tuttle's conclusions by following the intricacies of his argument and calling attention to its fallacies. But under the circumstances a shorter and simpler method seems to be better.

* Dr. T. D. Tuttle, "Death-rates in Old and Young States," in *American Journal of Public Health*, Vol. VII (1917), pp. 359–377.

† W. F. Willcox, "Some Population Statistics of the Pacific Coast States," in *American Statistical Association Publications*, Vol. XIV (1914–15), pp. 711–726.

Let me ask first, How small a death-rate will be accepted by experts without suspicion that it is inaccurate? A trained statist would raise this question almost instinctively at the threshold of our present subject and yet in his extended discussion Doctor Tuttle makes no mention of it. He does say, however, "that a death-rate of 9.0 or less in Washington, Oregon, Utah, Montana or any other of our very young states . . . is not unreasonable" (p. 372).

When Iowa was a very young state, its annual death-rate according to the State Board of Health was 4.5.* Would Doctor Tuttle accept such a rate for the Iowa of 1885 or the Washington of 1915 as "not unreasonable?" If he would not, at what point along the scale between 4.5 and 9.0 would scepticism become reasonable and why?

In seeking an answer to this question I will consider first expert opinion and then the evidence on which that opinion stands. I begin with English expert opinion because vital statistics has had a longer and richer development in England than in any other country.

The rate of 17 per 1,000 was long regarded in England as the standard rate for an increasing population and any excess as evidence of unsanitary conditions. From Doctor Tuttle's statement that, if one of these very young states "does not hold her death-rate at or below 10.0 per thousand population she is justly entitled to condemnation for failure," I infer that he would use this rate as a standard much as the rate of 17.0 per 1,000 was long used in England.

That the tendency in England has been towards lowering the standard rate to a point much nearer the one accepted by Doctor Tuttle is shown by the fact that, while at first the rate of 17 per 1,000 was chosen as the upper limit of decennial rates in districts to be included in the Healthy Districts (areas which have long been used in that country as their nearest approach to a realization of the sanitary ideal), yet for the decade, 1881-90, this upper limit was reduced to 15 per 1,000 and for the decade 1891-1900 to 14 per 1,000. For the last decade the lowest rate in any of the 631 registration districts of England and Wales was 12.3 per 1,000.

That a rate not much below the first English standard of 17 per 1,000 was regarded twenty years ago as the lower limit of the range in American cities is indicated by the reply which I received in 1898 to a question about the reported death-rate of Buffalo in 1897. Dr. John Shaw Billings, to whom my question was addressed, was then undoubtedly the first authority on vital statistics in the United States. He wrote: "The presumption against a city of 350,000 people with a density of population of about fourteen to the acre having a death-rate even for one year of 12.4 is very great—so much so that I should feel sure that, if the city of Buffalo makes such a report, either the population has been overestimated or all the deaths have not been reported. . . . Whatever the explanation may be, the possibilities are at least 50 to 1 that the death-rate in

* "Mortality vs. Immortality," in *American Statistical Association Publications*, Vol. II (1890-91), p. 152.

Buffalo has not been below 15 per 1,000 per annum." After the population of Buffalo in 1900 had been counted it appeared that its population in 1897, when it claimed a death-rate of 12.4, had been greatly overestimated by the city authorities; and, by correcting that estimate, the rate was raised from 12.4 to 13.8. If the number of deaths in the city of Buffalo in 1897 as reported by the New York State Department of Health be substituted for the much smaller number reported by the Buffalo Department and the corrected estimate of population be used, the city death-rate in that year is further increased to 15.5.

In connection with the American census of 1900 it was decided to accept the local returns of deaths where they existed and yielded rates intrinsically probable and, in all districts where local returns were lacking or yielded improbable rates, to ask the enumerators to inquire of each family about deaths during the previous year. Mr. King, then Chief Statistician for Mortality, asked my opinion regarding the limit to be thus fixed and I suggested 15 per 1,000. In the end that limit was adopted by the Census Office.

As the death-rates in most civilized countries have been falling for several decades, the lower limits of the range within which death-rates may be accepted as not on their face open to suspicion or rejection have likewise been falling. My own answer to the question I have stated would be this: Under present American conditions and in a normally constituted but increasing population a death-rate of below 14 may be viewed with serious question; a death-rate of below 12 is presumably incorrect, that is, it shifts the burden of proof and no statist should accept or use such a rate unless the authorities responsible for its accuracy offer convincing evidence that the sources of serious error have been considered and eliminated; a death-rate of below 10 no more deserves serious statistical analysis than does the claim also sometimes defended by statistical evidence that vaccination does not diminish the chance of contracting smallpox.

Thus far I have merely marshalled the opinions of statistical experts. But their opinions have only a preliminary value and the final answer must depend upon the evidence supporting them. So I turn to the next question, Why do experts look askance upon published death-rates below a certain limit? Let me make the question specific and apply it to the present situation. Why do experts look askance upon the published death-rate of Washington in 1910, namely 10.0 per thousand? I select the year 1910, for two reasons; first, that year had the highest death-rate recorded for Washington since it was admitted to the registration area in 1908 and consequently, if the rate in 1910 is incredible, all the others must be rejected; secondly, 1910 was the census year and by choosing that date we throw out of court Doctor Tuttle's arguments about the correctness of the Census Bureau's estimates of the population of Washington for years since 1910.

A death-rate of 10 per 1,000 means, of course, that one per cent. of the population died in the year and, if maintained through a long series of years, it means that not more than one per cent. died in each year and, consequently, that a period of one hundred years would be required before the population would be dead. This does not mean that everyone would live to be one hundred years old; but, if the population was a stationary one, so-called, that is, one which for years had been recruited only by births and reduced only by deaths in equal number, then the average duration of life in the state would be one hundred years.

But Doctor Tuttle and those who agree with him would reply that the population of Washington is not stationary. The whole argument of my paper, he would say, applies only to "young states" in which the population departs so widely from the stationary condition as to make the objection entirely inapplicable and irrelevant. This reply has force and I admit that, if it cannot be met, all that has thus far been urged goes only a short way toward undermining his conclusion. To meet his objection, the difference between a stationary population and the population of a "young state" like Washington must be measured, a step which, I believe, has not been taken in any previous discussion of probable and improbable death-rates. To make the question specific and applicable directly to the present problem, I will phrase it thus: If all the recorded rates in Washington in 1910 for each sex and each age period had remained unchanged, but if the population to which they applied, instead of being that characteristic of a young state, had been an ideal stationary one like that for which a life table speaks, what would have been the death-rate in Washington? Obviously the rate would have been higher than 10 per 1,000 and the excess above 10 would measure the influence of the peculiar sex and age composition of Washington in reducing its death-rate. The death-rates in Washington in 1910 for each sex and age period are given in columns 2 and 5 of Table I. In computing them the population and the deaths in Washington of unknown age, each between one-half and three-fourths of one per cent. of the total, have been disregarded.

On applying these rates to the population column in the life tables for white males and white females in the original registration states 1909–11,* the numbers of deaths shown in columns 3 and 6 of Table I are obtained.

This table means that, if the rates reported in the state of Washington in 1910 had been just what they were but the population, instead of having the sex and age composition characteristic of a "young state," had been "stationary," or of the sort that would result from no immigration, no emigration and equal and uniform numbers of births and deaths for a generation, then the death-rate in Washington in 1910 would have been 14.25 instead of 10.0. In other words,

* Bureau of the Census, *U. S. Life Tables*, 1910 (Gov't Printing Office, 1916), pp. 22–25. I have reduced the population in those two tables to a standard million of the two sexes.

TABLE I.

ESTIMATED DEATH-RATE IN WASHINGTON UNDER ASSUMPTION OF A STATIONARY POPULATION, 1910.

Age.	*Male.*			*Female.*		
	1 Population.	2 Death-rate.	3 Estimated deaths.	4 Population.	5 Death-rate.	6 Estimated deaths.
Under 1	9,011	98.28	886	8,876	69.89	620
1– 4	33,411	8.37	280	33,186	7.51	249
5– 9	40,623	3.22	131	40,435	3.65	148
10–14	40,072	2.75	110	39,948	2.88	115
15–19	39,505	4.52	179	39,436	3.34	132
20–24	38,617	5.72	221	38,656	4.97	192
25–29	37,559	5.73	215	37,678	5.96	225
30–34	36,348	6.18	225	36,564	5.55	203
35–39	34,866	7.68	268	35,302	5.99	211
40–44	33,143	8.29	275	33,914	7.09	240
45–49	31,140	10.54	328	32,298	7.24	234
50–54	28,817	12.98	374	30,334	9.86	299
55–59	25,925	20.26	525	27,787	16.01	445
60–64	22,273	27.35	609	24,455	22.44	549
65–74	31,078	46.61	1,448	26,057	34.70	904
75–84	12,424	102.03	1,268	15,510	86.26	1,338
85–94	1,910	186.50	356	2,682	153.23	411
95	66	228.57	15	94	266.69	25
Total	496,788		7,713	503,212		6,540

Both Sexes: Population 1,000,000; Deaths 14,253; Death-rate 14.25.

the reported death-rate of Washington would have been about 42 per cent. higher than it was, if the population had been "stationary" and distributed to sex and age classes as in the life tables for white males and females in the registration states of 1900 for 1909–11 and if all other conditions had been unchanged.

We are now in a position to ask the question in the following words, Do experts doubt the accuracy of a death-rate of 14.25 in a "stationary" population and, if so, why?

They do doubt that accuracy and for the following reasons:

1. The average duration of human life in a "stationary" population is found by dividing 1,000 by the death-rate per 1,000. If 14.25 per 1,000 of the population die each year, it will require a period of about 70 years for the whole population to die. This does not mean that everyone born will live to be 70 years old, but it does involve the corollary that the total number of years lived beyond 70 by those who survive that age will be equal to the number of years short of 70 not lived by those who die before that age.

The greatest average duration of human life recorded in any life table with which I am acquainted is found in the table for white females in the rural part of the registration states of 1900

for the years 1909–11. That duration is 57.35 years. If the average duration of life in Washington is 70.3 years, then the length of life in that state is between one-fifth and one-fourth longer than in the healthiest region for which we have this information. That Washington is so much healthier than any other region in the world for which the facts are known will be denied by experts, because inaccuracy in the record is far more likely than so exceptional a duration of life.

2. The median duration of life is that duration at which the initial number of births is reduced by one-half. As the deaths in infancy are more numerous than in any other equally long period of life, and as these infant deaths have far more influence in lowering the average than in lowering the median duration of life, the latter is regularly several years greater than the former. Thus, in the life table for white females in the rural part of the registration states the average duration of human life was 57.35 and the median duration was 67.38. Probably the difference between the average and the median duration of human life in Washington is at least as great. If so, and if the 1910 death-rate was correct, the median duration of life in Washington is about 80 years. This would mean that of a given number of children born in that state one-half would live to and beyond 80 years of age. This again is so far outside of the range of probabilities attested by records in many countries and through long periods of time that no expert is likely to give it serious attention.

3. The death-rates in many of the counties of Washington are incredible. The deaths for a single year are often too few to give a representative rate. To avoid that objection, I have found the annual average number of deaths in each county for the period 1908–12 and compared it with the population

TABLE II.

DEATH-RATES IN COUNTIES OF WASHINGTON.

County.	Population 1910.	Average annual number of deaths 1908–12.	Death-rate.
Wahkiakum	3,285	9	2.7
Douglas and Grant	17,925	71	4.0
Cowlitz	12,561	77	6.1
Klickitat	10,180	62	6.1
Island	4,704	29	6.2
Franklin	5,153	34	6.6
Stevens and Pend Oreille	25,297	170	6.7
Pacific	12,532	85	6.8
Adams	10,920	75	6.9
Okanogan	12,887	89	6.9
Ferry	4,800	34	7.1
Skamania	2,887	21	7.3
Asotin	5,831	43	7.4
San Juan	3,603	27	7.5
Kitsap	17,647	134	7.6
Whitman	33,280	268	8.1
Chehalis	35,590	291	8.2
Lincoln	17,539	143	8.2
Benton	7,937	66	8.3
Clarke	26,115	220	8.4
Mason	5,156	44	8.5
Snohomish	59,209	511	8.6
Lewis	32,127	280	8.7
Whatcom	49,511	430	8.7
Skagit	29,241	259	8.9
Columbia	7,042	64	9.1
Thurston	17,581	162	9.2
Chelan	15,104	141	9.3
Garfield	4,199	39	9.3
Walla Walla	31,931	298	9.3
King	284,638	2,680	9.4
Jefferson	8,337	82	9.8
Clallam	6,755	71	10.5
Kittitas	18,561	195	10.5
Yakima	41,709	444	10.6
Pierce	120,812	1,351	11.2
Spokane	139,404	1,560	11.2

enumerated in 1910. The results appear in Table II in which a few counties have been combined because the boundaries between them changed within the five year period.

Before accepting any of the rates in Table II the statist will ask whether the sex and age composition of the population or the sanitary conditions of the county or both make the rate probable. But many of them are to be rejected without raising that question because the rates are so improbable as to be discarded at once.

4. The presumption against the accuracy of these registration figures is strengthened by the number and kind of errors which crept into the Federal census of Washington in 1910. At every census a few regions, usually cities, in various parts of the United States, try to bring the results of the enumeration up to their own inflated ideas on the subject, sometimes by honest mistakes, but usually by fraudulent and illegal practices. In 1910 there were 23 cities in the United States which were discovered by the Bureau of the Census to have been seriously over-counted and of these nearly half were in the state of Washington. In Tacoma, says the Director of the Census, "the frauds in the original enumeration were peculiarly flagrant and extensive."* The Federal expert in charge of the enumeration for the whole country and the best man in the United States in that field was sent out to Tacoma and made a complete reënumeration of the city. As a result the population was reduced from the reported number, 116,270, to 83,743, a loss of 32,527, or 28 per cent. In 9 other cities of Washington also the population figures were reduced. Of course it is possible that the figures for the state even after these corrections were far too large and that the error in the death-rate is due to a padding of the population count rather than to omissions in the death records. But errors in an enumeration are far easier to detect than errors in the registration of deaths and as the former source of error was carefully studied and the other almost ignored, it is probable that the main, if not the only, cause of error in the death-rate is omission of deaths.

I have recited briefly the reasons which arouse a skepticism of the reported death-rate in Washington and a belief that it has not in any year been as low as 10 per 1,000. Since that is the point I started to argue, it might be well now to stop.

But most of Doctor Tuttle's article is a criticism of the census estimates of population, for the method of which I am partly responsible. He thinks them grossly erroneous and proposes a new method. Hence a few words elucidating his last conclusion may be in place. When a method of estimating population had to be adopted the committee appointed to make recommendations on the subject sent a letter of inquiry to about 50 persons in various parts of the United States who were familiar with vital statistics. Nearly all in their replies advocated the arithmetical method of estimate and, as all members of the committee also

*Bureau of the Census, *Annual Report of the Director* for 1909–10, p. 26.

were in favor of that method, we found no difficulty in making a unanimous report.

Any method which assumes that the population grows regularly is bound to be a misfit when applied to a population which grows irregularly, as it does in the far western states, and many estimates of population, therefore, especially for the later years of a decade, are bound to be wide of the mark. The reasons for preferring the census method to any alternative then in sight were carefully explained in a chapter of my report made in connection with the census of 1900.*

The method which Doctor Tuttle now proposes is novel and was not then before us. It rests on the assumption that there is a constant ratio between the population and the deaths from other than preventable causes and leads to the conclusion, which he points out with unconscious humor, that a serious increase in the deaths from influenza would result in a sharp increase of the estimated population. Further comment is superfluous.

* "Methods of Estimating Population" in Census of 1900, *Supplementary Analysis*, pp. 580-594.

SYPHILIS IN THE AUSTRIAN ARMY.

In a recent issue of the *Wiener Klinische Wochenschrift* (XXIX., No. 51), Hecht, an Austrian army surgeon, states that in his corps records are now kept of every man with venereal disease, and a certain mark opposite the name of a man on the register indicates that in no circumstances is he to be granted home leave. This restriction of home leave had previously been enforced for typhoid carriers. Hecht adds that no one seems to class the venereal diseases with infectious diseases, but he is convinced that this neglect to apply the measures that have been found reliable with other infectious diseases will avenge itself sooner or later. He estimates that the number of syphilitics in the Austrian army now must certainly be several hundreds of thousands, and complains that they are being treated in hospitals, while sound and healthy men are being shot down in their stead. This actually places a premium on sexual infection, for the healthy have no chance of a few months' respite in the hospitals from the fighting. The effect likewise is to spare the syphilitics while the sound get killed off. He makes the very reasonable suggestion that the diagnosis should be the signal for sending the man to the front. This would have a deterrent effect; at present many prefer to take their chances with syphilis rather than with the enemy's shells. Hecht thinks it might be possible to form special companies of syphilitics as soon as the ulcers have healed over, so that the treatment could be conveniently continued and applied on the firing line, while infection of other troops would be prevented. Neisser long insisted that courses of salvarsan and mercury could be given perfectly well in the trenches. Hecht declares that it is impossible to reiterate too often the frightful danger for the populace from syphilitics in the primary phase. Since the war began, a total equivalent to sixty divisions have been temporarily withdrawn from the fighting for venereal diseases. In conclusion, Hecht insists on the necessity for enlightening the public in regard to the danger of venereal disease in candidates for matrimony. —*Medical Officer, London.*

THE COMPOSITION AND RELATIVE ECONOMY OF SOME BREAD SOLD IN WASHINGTON, D. C.

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IN VIEW of the fact that the price of bread has been advanced in most cities, food and health officials and the public are especially interested in the composition and nutritive value of the staff of life as sold today. The health department of the District of Columbia was interested further to learn the relative economy of the variously priced loaves. Consequently forty-six samples of bread, representing the products of the principal bakeries of the District of Columbia, were purchased during the month of January by inspectors of the health department and analyzed in the chemical laboratory of the department.

In the analyses of these samples the following determinations were made: Weight of loaf, moisture, protein and ash. Calculations to determine the amount of bread and of solid matter which each cent spent by the pur-

TABLE I.

COMPOSITION OF BREAD.

	4c loaves.	5c loaves.	6c loaves.	10c loaves.	12c loaves.
Weight of loaf:					
Maximum	11.74 oz.	13.01 oz.	12.90 oz.	24.20 oz.	25.60 oz.
Minimum	8.78 "	9.28 "	10.19 "	20.50 "	21.00 "
Average	9.95 "	10.91 "	11.79 "	21.66 "	23.51 "
Moisture:					
Maximum	36.91%	37.60%	39.25%	38.13%	36.59%
Minimum	31.84%	30.57%	30.10%	32.93%	30.51%
Average	34.29%	33.81%	35.13%	34.70%	33.81%
Protein:					
Maximum	8.49%	8.69%	8.47%	8.695%	8.67%
Minimum	7.93%	6.82%	6.49%	7.435%	7.785%
Average	8.23%	7.82%	7.53%	7.890%	8.190%
Ash:					
Maximum	1.075%	2.41%	1.485%	1.505%	1.235%
Minimum	0.910%	0.87%	0.870%	0.705%	1.020%
Average	1.020%	1.26%	1.050%	1.040%	1.130%
Solids:					
Maximum	8.25 oz.	8.93 oz.	8.95 oz.	15.90 oz.	18.05 oz.
Minimum	5.75 "	6.44 "	6.70 "	13.57 "	13.90 "
Average	6.67 "	7.06 "	7.63 "	14.59 "	15.83 "
Number of loaves analyzed	5	11	22	5	3

chaser can buy were also made. The reason for these calculations will appear later. The methods of analysis used were those of the Association of Official Agricultural Chemists with the exception of the method of determining moisture. For moisture the method described by Wessling* was used with satisfactory and concordant results. The results of these analyses, grouped according to the price of the loaf, is summarized in Table I.

From the data furnished in this table an approximation of the relative economy to the purchaser of the variously priced loaves was obtained in the following manner: The average weight of the loaves of each class was divided by the cost of the loaf, giving in directly comparable figures the amount of bread purchased by each cent spent by the consumer in each case. Since the solids of bread and not the moisture constitute the factors of nutritive value a similar calculation was made for bread solids. Furthermore, because of the importance and relative expensiveness of protein, the above calculations were also made for protein. The following statement shows the relative economy of the variously priced loaves.

On the basis of these analyses, therefore, the four cent loaves appear to have been by far the most economical as offering the maximum amount of nutriment for a given expenditure. The ten cent, five cent, twelve cent and six cent loaves follow in the order named. It is to be noted that the highest priced loaves (ten cent and twelve cent) were not the most economical, as we had been led to believe. It is to be noted further that the six cent loaves, which constitute the most largely sold single class in Washington, appear to be the least economical of all.

These results are surprising and it may be argued that the conditions under which the four cent loaves are produced are so insanitary as to counterbalance their greater economy. This contention is not borne out by the facts, however, for inspections of these bakeries by the Bureau of Sanitary Inspection of the Health Department show them to be in good sanitary condition.

As the price of bread in the District

*J. Ind. & Eng. Chem., 8 (1916), 1021.

TABLE II.

RELATIVE ECONOMY OF BREAD.

	4c loaves.	5c loaves.	6c loaves.	10c loaves.	12c loaves.
Weight of bread for each cent spent	2.49 oz.	2.18 oz.	1.97 oz.	2.16 oz.	1.96 oz.
Weight of solid matter for each cent spent	1.67 oz.	1.43 oz.	1.27 oz.	1.46 oz.	1.32 oz.
Weight of protein for each cent spent	0.205 oz.	0.170 oz.	0.148 oz.	0.170 oz.	0.161 oz.

of Columbia was raised about November 1, 1916, the following figures are interesting:* The average weight of the present six cent loaves is 11.79 ounces, while the average weight of thirty-six five cent loaves purchased prior to November, 1916, was 12.55 ounces. In other words a price increase of 20 per cent. was accompanied by a loaf weight decrease of 6 per cent. The average weight of the loaves now sold for five cents, 10.91 ounces, is about 13.06 per cent. less than the average weight of the loaves sold for five cents prior to November, 1916. To state it somewhat differently: Before November, 1916, every penny spent by the consumer brought him 2.51 ounces of bread, while now it brings him only 1.97 ounces in the case of the six cent loaves or 2.18 ounces in the case of the five cent loaves. The purchasing power of the penny has shrunk 21.5 per cent. and 13.1 per cent. respectively.

* The price of bread in Washington was again raised about May 3, 1917. Four cent and five cent loaves are no longer sold. These now sell for six cents. The average weight of four such loaves was 9.42 ounces avoirdupois or 1.58 ounces, for each cent spent, a decrease in purchasing power of 36.54 per cent., based on the figures given above. The loaves formerly sold for six cents are now variously sold at eight, nine and ten cents per loaf. An eight cent loaf weighed 13.47 ounces or 1.69 ounces for each cent spent; the average weight of two nine cent loaves was 17.07 ounces or 1.90 ounces for each cent spent, while the average weight of four ten cent loaves was 14.72 ounces or 1.47 ounces for each cent spent. In the place of the former ten and twelve cent loaves, we now have fourteen and fifteen cent loaves. The average weight of two fourteen cent loaves was 21.25 ounces or 1.52 ounces for each cent spent, while a fifteen cent loaf weighed 27.4 ounces or 1.83 ounces for each cent spent. A comparison of these figures with some of the data given in the body of this brief article will prove illuminating, but depressing.

Summary.

I. Analyses of variously priced loaves of bread sold in Washington, D. C., show the four cent loaves to be the most economical and the six cent loaves the least economical.

II. The ten cent and twelve cent loaves are not the most economical.

III. The purchasing power of the consumer's penny as regards bread has decreased 13.1 per cent. to 21.5 per cent. since November, 1916.

◆

OUR DUTY.

The war in Europe has wrought great havoc; it has destroyed millions of lives, has maimed and crippled many men, has littered the fields with shells of destruction, dismantled cities, and crumbled into dust some of the most stately edifices, both secular and religious, ever conceived in the brain of man or reared by his hands. Civilization is not to be lost, and the upward progress of the race is not to be permanently arrested. The potent saving factor in this great catastrophe is scientific medicine. Had disease followed these great armies in like proportion as it accompanied smaller armies in the past, the better part of civilization might have been lost. But in all the belligerent countries medical science has stayed the pestilence and coped successfully with typhoid, typhus, plague, cholera and other infections which in the past often wrought greater havoc than war and determined the fate of nations. The obligation has come to us. Let us lay aside our individual interests, forget our personal desires and professional ambitions, and with one accord proceed in the execution of the duty that lies before us.—*Journal of the American Medical Association.*

Book Reviews.

The Internal Secretions. *By E. Gley (Paris), translated by Maurice Fishberg. New York: Paul B. Hoeber. 1917. Pp. 241. Price, $2.00.*

This is not a simple summary of the accepted facts regarding the endocrine organs and their functions. It is, rather, a thoughtful critique upon some of the current conceptions. As such it does not readily lend itself to a condensed review. To an American reader it seems that a good deal of important work published in English has been overlooked.

One point at least among those emphasized by Gley deserves restatement. This is his protest against the common practice of testing the physiological action of an extract and assuming that it will be identical with that of the principle secreted by an organ during life. Post-mortem extracts are sure to contain compounds which would not normally escape from the living tissue and the effects of such preparations may be entirely misleading. *Percy G. Stiles.*

Clinical and Laboratory Technic. *By H. L. McNeil, A. B., M. D. C. V. Mosby Company, St. Louis, Mo. 1916. Pp. 84. Price $1.00.*

This little book of eighty-eight pages purports to be a brief for history taking, an outline for physical examinations and a compend of the most practical tests in laboratory diagnosis. The first two topics are very briefly covered, each consisting practically of a résumé of the questions to ask or the morbid conditions to look for. They are very suggestive. In the section upon laboratory diagnosis the common tests of the urine, blood, sputum, gastric and duodenal contents, feces, spinal fluid, etc., are briefly described. We look in vain for the simplest and by many considered the most universally desirable test for albumin in urine, namely the cold nitric acid test. Equally futile is the search for the iodine test for bile. The illustration differentiating various forms of epithelial cells is in particular open to criticism. Much of the section is very commendable. In the section on hæmatology we note with surprise the omission of reference to any form of counting chamber for leucocytes except the simple and original Thoma type thus requiring several "fillings" for a single count. The antiformin method of examining sputum for bacilli tuberculosis is very clearly given.

It seems very questionable whether the average physician will ever attain the dexterity of performing Wassermann tests even with the doubtful assistance of the already prepared antigens and amboceptor of commercial firms. It would seem, therefore, unwise to devote twelve pages or about one sixth of the entire text to description of the technic. This is too much for a mere summary of the test, not enough for a complete guide to one who intends to do acceptable work from this article alone.

The book as a whole seems to be unevenly balanced, giving undue emphasis to the less important methods at the expense of some of much greater importance. It contains a brief and unusually satisfactory description of most of the common tests that a general practitioner will be called upon to make, all arranged in a compact and easily accessible manner. As such it is worthy of much commendation. It is very neat in appearance and well printed with no noted typographical errors. *H. W. Watters.*

Practical Urinalyses. *By B. G. R. Williams, M. D. C. V. Mosby Company, St. Louis, Mo. 1916. Pp. 139. Price, $1.00.*

The author has prepared a little book that is intended to give emphasis to certain points often overlooked by the average physician. It makes no pretence of replacing other existing works; on the contrary it urges its readers to consult the larger books for a better comprehension of the entire subject. Much of interest and value is contained in its one hundred and fifty pages, but as it is admittedly incomplete and offers practically nothing new, we do not see the reason for its appearance.

H. W. Watters.

Handbook of Suggestive Therapeutics, Applied Hypnotism, Psychic Science. *By Henry S. Munro. Fourth Edition, revised and enlarged. St. Louis, C. V. Mosby Co. 1917. Price, $5.00 net.*

The easy style and somewhat popular appeal of this book explain the appearance of a fourth edition. It is essentially an enthusiastic plea for the wider extension of suggestive methods in general medicine; while it cites no new facts and presents observations in the most uncritical way, it shows a therapeutic optimism which must add to its popularity. In this respect it has much in common with the works on Psychotherapy by Dubois, and Dejerine and Gauckler, but the author makes no pretension to any deep psychological analysis of the phenomena which he discusses. While in no way to be recommended as a book of reference or as a systematic exposition of the subject, the book is entertaining, shows much good common sense and should be stimulating to the general practitioner.

C. *Macfie Campbell, M. D.*

Health Department Reports and Notes.

REPORT.

Buffalo, N. Y.

The chief feature of the 1916 Report of the Department of Health of Buffalo, N. Y., is the report of the complete development and establishment of the several health centers in the city. By a health center it is understood to be a sub-station of the department of health organized for curative and preventive work in a given district, thus attempting to reach fundamental conditions and to bring the department in a closer touch with the people. Originally limited to infant welfare and dental service the function of these centers has extended to include preventive work. These centers properly established have induced the abolition of the obsolete methods for the caring of the city sick poor; the maintenance of uniform standard records with a system of interchange between the various departments and social organizations interested; the creation of a central dispensary to refer all cases to, not coming within the function of the health centers. The system as established in Buffalo is most complete, the centers, of which there are four, acting as distributors of milk and eggs, laboratory outfits, sputum napkins for the tuberculous, and the like. To quote the results of Buffalo's one year experience in this matter:

"Experience shows that the health center brings the Department of health in close relation with the people and elicits a responsive attitude. It secures the reporting of contagious diseases and lessens their spread. Morbidity and mortality are greatly influenced. Duration of sickness is lessened and restoration to health promoted by securing selective and appropriate hospital and other care for the sick and by following up cases of convalescence after institutional treatment. Pre-natal and child welfare work makes for better individuals, and hospital patronage by pregnant women is increased. Traditional prejudice and distrust of hospitals and dispensaries is offset and hospital care of contagious cases increased. The system of uniform records and interchange prevents duplication of work and imposition by the unscrupulous.

"Finally, it is demonstrated that all social service agencies, philanthropic organizations, hospitals and dispensaries, should be co-related for successful public work."

Buffalo has further advanced her service in the organization of an advisory council to the department, composed of representative physicians and laymen, all acting without compensation, and whose function it is to consider and advise on debatable conditions and innovations that may affect the community at large.

The reports of the Bureau of Vital Statistics and Bureau of Communicable Disease show an excellent reduction effected in the case of mortality and morbidity during early life, the direct result of progressive and intensive health

work. Contrasted to these reduced rates, however, is the ever increasing mortality during middle age and advancing life from the so-called degenerative diseases, a fact which is causing this city's department no little concern. Typhoid fever remained at approximately the low level reached last year, there being reported only 51 deaths from this disease. It is interesting to note that this department absolves itself from all blame in connection with the 69 deaths from diphtheria, in that free antitoxin and free laboratory facilities are furnished. This stand seems justified in view of modern conditions. The Department also takes a firm stand on account of the deaths from measles, and whooping-cough, believing the deaths reported, 71 and 43 respectively, are due in the main to negligence and refusal to heed advise. The crude death-rate for this city for the reported year was 16.00 per 1,000 population; deducting for deaths of non-residents, there is obtained a death-rate of 14.76 per 1,000.

The same thoroughness is observed in this report as in the reports of the previous years, resulting in the production of a report which well demonstrates the scope of this department's endeavors in all fields. Tuberculosis and infant welfare work have proceeded with the same vigor and search for fundamental factors which no doubt accounts for the quite brilliant success Buffalo has attained in these two fields. The work of the laboratory has constantly increased in scope, until at the present time it is able to carry out research work relative to the best routine procedures to be used and like work.

It is to be noted that Buffalo still adheres to the policy of terminal fumigation. During 1916 over 2,000 houses were fumigated. In view of the experience of New York City, Providence, R. I., and other cities which have abandoned this procedure, it would seem that the expense entailed for the carrying out of fumigation, which is not inconsiderable, might be better utilized elsewhere.

The financial statement, subdivided as to functions, gives one a most adequate idea as to the relative value Buffalo attaches to the several activities of its health department. It is unfortunate that a report of this general excellence should lack an index or table of contents, the including of which would add greatly to its general usefulness.

NOTES.

Epidemiology of Bacillary Dysentery.—An investigation was made by Dr. Wilson G. Smillie of the etiology of 75 cases of bacillary dysentery occurring during the summer months in Boston. The sources of these cases are traced as follows:

Contact with acute case	21
Contact with carrier	2
Contact with house case	4
Condensed milk epidemic	15
Ice cream cones	9
Flies	6
Milk	1
Water	1
Fruit	1
Unknown	15
Total	75

The author's results disagree with those of other investigators, for he finds no close causal relation between high temperature and humidity, and the incidence of dysentery. He is more inclined to associate the disease with flies "for the disease had hardly begun before the hot weather was over, and the cases lasted well into September—long after the humid weather was past, though flies were still in abundance."

Contrary to expectation, illiterate foreign families were afflicted less than the poor class, careless and neglectful Americans, particularly the first generation families. This was ascribed to the simple fact that most foreigners nurse their babies, while American mothers often do not.

In his conclusions, the author emphasizes that bacillary dysentery is a readily communicable disease which may be readily spread by means of contact with an acute case or a carrier, by means of food (as milk, condensed milk, and ice cream), by water and by flies.

Sporadic summer dysentery of infants may be transmitted to older children or adults, but is usually milder among the latter.

Dysentery bacilli from a mild adult case may produce a rapidly fatal case among infants. The adult mild case is therefore a menace to the community.

Bacillary dysentery is rarely found in the nursing baby.

Hospital cases are not uncommon. The disease being transmissable by direct contact, no hospital has a right to admit patients with dysentery unless it can make provisions for their isolation.

The investigation is reported in the *American Journal of Diseases of Children* for May, 1917.

✟

How a Life Insurance Company Helps in Birth Registration.—Public health officers are familiar with the use which the Metropolitan Life Insurance Company has made of its agency force in gathering statistics of sickness and of unemployment. Doctor Dublin, Statistician for the Company, has described in the March issue of the *Quarterly Publications of the American Statistical Association* another health activity of interest to health officers in which the Company's agents are engaged. This consists in the coöperation with registrars of vital statistics in the improvement of birth registration.

The company has printed for this purpose mailing cards like the following:

The Health Officer ..... 191....
(date)
Dear Sir:

My baby .....
(name)

was born on ..... 191....
(month) (day)

at .....
(number) (street) (city)

Please send me your literature on how to keep my baby well.

.....
(parent)

When the plan was first put into operation these cards were filled out by the parents and mailed to the local or state registrar of vital statistics whose address was printed on the reverse side. Experience showed, however, that frequently the parents did not fill out and mail the cards when they were left with them by the agents. In order to overcome this difficulty the plan has been changed and the agents are now instructed to fill the cards out themselves and bring them to the company's district office. Here they are allowed to accumulate until the end of the month when they are mailed to the registrar of vital statistics. According to this plan the company's cards reach him in bulk at about the same time the certificates come in from the local registrars in the regular way. The two sets of returns are then checked to ascertain the proportion of births not registered by attending physician or midwife.

The plan is now in active operation in Connecticut, Maryland, Oklahoma, Utah, Virginia, North Carolina, and Indiana, and is being extended to South Carolina, Montana, Washington, West Virginia and other states. Reports from Indiana indicate that from 18 to 20 per cent. of the births reported by the Metropolitan agents are found not to have been previously registered by attending physician or midwife. In Maryland and Connecticut, states in the Federal Birth Registration Area, the number of unregistered births reported has, of course, not been so large. In the last consignment of cards sent in Maryland three births were found not to have been previously registered; and the physician at fault in one of these cases was successfully prosecuted for violation of the law. In the last consignment of Connecticut cards three births were also found not to have been previously registered.

Health officers will watch with interest the results of this method of improving birth registration.

✟

Infant Mortality in Old and Young States.—In connection with Doctor Tuttle's paper on "Death-rates in Old and Young States" a recent discussion of the differences in infant mortality in the Eastern and Western states and cities of the country is of interest. In a monograph on "*Infant Mortality—Its Relation to Social and Industrial Conditions*" published last year by the Russell Sage Foundation, H. H. Hibbs, Jr. shows that the differences in the death-rates for infants in these two sections of the country is very marked. He presents a table showing the infant death-rate per 1,000 population under one year of age for the states included in the Registration Area. The states are arranged in an ascending order according to their infant death-rates and the reader is at once struck with the fact that almost without ex-

ception the lowest rates are to be found in the Western and the highest in the Eastern states, with the North-Central or Middle-Western states in between. Thus the average infant death-rate for the 5 Western and Mountain states included was 91, for the 6 North-Central states, 108, and for the 9 New England and Middle-Atlantic states, 149.

The same thing is also shown in another table giving the infant death-rate per 1,000 population under one year of age for the 46 largest cities of Registration Area. The average infant death-rate per 1,000 population under one year of age was 115 for the 7 Western and Mountain cities included, 149 for the 14 North-Central or Middle-Western cities, 165, for the 7 Southern cities, 162 for the 9 Middle-Atlantic cities, and 181 for the 8 New England cities. Thus, whether states or cities are compared, the further West we go the lower the infant death rates.

The writer accounts for this marked difference in infant mortality on somewhat the same grounds as Doctor Tuttle, although he lays less emphasis upon the influence of climate and more upon differences of economic and social conditions.

*

Sale of Skimmed Milk Legalized.—The New York legislature has recently passed an act amending the old agricultural law so that it reads as follows:

"The prohibition contained in this article against the sale of adulterated milk shall not apply to skim-milk, which is clean, pure, healthy, wholesome and unadulterated, except by skimming, if it is sold for and as skimmed milk. The prohibitions in this article against the sale of cheese made from adulterated milk or cream, shall not apply to pure skim-cheese made from milk which is clean, pure, healthy, wholesome and unadulterated, except by skimming. This act shall take effect immediately."

Thus, according to the May 12 *Weekly Bulletin* of the New York City Department of Health, the effort to legalize the sale of skimmed milk which has been made by that department since 1907, has finally culminated successfully.

The department expresses its approval of this amendment, realizing that but for its diminished fat content, skimmed milk contains all the valuable food constituents found in whole milk. While in the past this valuable article of diet has either been used by the farmer for feeding pigs, or the milk has been soured and the casein dried to be used in the manufacture of buttons, with the passage of this new law this extravagantly wasteful procedure no doubt will be eliminated.

*

Laboratory Organization.—A course on Laboratory Organization and Management is offered in connection with the Summer Sessio at Columbia University by Professor Thomas B. Freas and Professor W. L. Estabrooke. This course is unique in character and content. No other course of its kind is given in any other university in the world. A short extract taken from a special booklet, which may be had upon application to the Director of Summer Session or Department of Chemistry, is here given.

The course is planned to take the students' full time for six weeks. The subjects covered will be: Location, laboratory construction, ventilation, etc. of buildings; laboratory equipment, including desks, lockers, shops, gas, electricity, water, suction, liquid and compressed air, balances, etc.; buying from foreign and domestic markets, economic and scientific handling of supplies; organization of stockroom employees and their coöperation with the teaching staff; glass blowing by a professional glass blower will be a special feature; a series of trips in and about New York to manufacturing establishments, industrial and university laboratories, including trips to Boston, Washington, D. C., Niagara Falls, Buffalo, Rochester, Syracuse and Philadelphia, in which there will be opportunity to observe actual application of chemistry to needs of the country from the most modern viewpoint, and especially to the needs of university, college, and research laboratories in order to meet the demands of modern chemistry.

*

The Health Appropriation.—Five per cent. of the available revenues is recommended as the health appropriation of South Bend, Ind., by Carroll Fox, Surgeon of the United States Public Health Service. As the population is

about 69,000, the recommended appropriation of $21,000 represents 30.5 cents per capita. Compared with appropriations in other cities possessing adequate health departments, this sum seems quite modest.

The recommendations further include a full-time health officer at $2,500; four inspectors at $900; five public health nurses at $900; diagnostic laboratory maintenance, $1,500; clerk, isolation hospital, transportation and miscellaneous, the balance of the $21,039.50.

In addition to the customary suggestions, Fox advises that the city install plumbing for those that can ill afford to pay for it, and permit payment in installments, as assessments are now paid in most cities; that the nursing work of philanthropic organizations and the schools be taken over by the Health Department; that plumbing inspection to be transferred to the building department; and that the coöperation of the police force be obtained in the investigation of nuisances.

The survey appears in *Public Health Reports* for May 25, 1917.

*

Bicycles for Visiting Nurses.—Advertisements in the London *Medical Officer* seem to indicate that bicycles furnish transportation to a considerable degree for public health nurses employed by Countil Councils. A typical want ad for "health visitors," as they are called, states that "the salary will be £105 a year (about $511), together with third class traveling expenses and £5 10s. a year towards uniform; the salary to be increased by £10 after two years of satisfactory service. Health visitors are expected to provide their own bicycles for occasional use."

Health visitors must be fully trained hospital nurses.

Public Health Notes.

Tuberculosis in France.—*The Survey* for May 5, 1917, contains an address, delivered at a recent meeting of the Association of Tuberculosis Clinics in New York, by Dr. Hermann M. Biggs, Commissioner New York State Department of Health. Doctor Biggs describes the tuberculosis situation as he has seen it in France during his recent study abroad.

Tuberculosis is playing a very large part in the sanitary history of the present war. Of the warring nations, France is suffering the most from this scourge.

Before the war, France had done practically nothing for the prevention of tuberculosis. The sanitary authorities have never taken official cognizance of the disease and notification of it is not required anywhere in France, even now. There have been no provisions for institutional care of either early or advanced cases, and but few dispensaries. At the beginning of the war there were in the whole of France only 1,000 sanatorium beds for tuberculosis, and these were in private institutions.

For the whole of France before the war the death-rate from tuberculosis was nearly twice that of New York State, and about three times that of England.

France mobilized a great army with great rapidity and without thorough physical examination of those enrolled. Many men thus enrolled rapidly developed pulmonary tuberculosis in the preliminary training camps, while still more broke down with active disease when subjected to the strains and hardships incident to life at the front.

In summing up the conditions in the French army, Doctor Biggs states, "the French troops are at all times, excepting when on the march, living under unfavorable hygienic conditions, those under which this disease is especially likely to be transmitted."

Over 150,000 of the French soldiers have already been discharged with tuberculous disease. There are at least 125,000 more cases among the French people living in the territory now occupied by the Germans. The French troops in German prison camps are suffering terribly from the ravages of this plague. It does not seem likely that the cases of tuberculosis in the civil population have decreased since the war began and this would mean another 150,000 cases. Doctor Biggs, therefore, believes that if the war were to be terminated at once, France would have altogether not far from 500,000 cases of tuberculosis to deal with.

At present about 11,000 beds for tubercular patients have been provided. There is great need for dispensaries, trained nurses and trained social service workers, and for physicians who are familiar with tuberculosis work.

The French government has in part realized the situation and is trying to meet the problem. Local initiative, however, is depended upon; and this will be lacking in many localities which seriously need immediate relief measures.

The author believes that it is not because measures for the prevention of tuberculosis are wanting or inefficient that the disease has become such a serious problem; but it is simply because the well-tried measures have not been applied, either before and since the outbreak of the war, in an efficient way.

✠

Water Purification in War Time.—"The water question still remains the supreme one in every military enterprise," states Capt. J. C. McWalter of the Mediterranean Expeditionary Force writing in *The Journal of State Medicine* for February, 1917.

In general, chlorination is the most satisfactory process. It is simple, it is cheap, it is safe and effectual. However, a great horror of chlorine in the water has developed among officers and troops in the English army. Captain McWalter believes this horror is partly due to the persistent use of the unappetizing adjective "chlorinated," and partly to the too generous use of chlorinated lime in many instances. He observes, "If an army order went forth deciding that it should be called "purified" rather than "chlorinated" very much of the prejudice against it would vanish. If just a little care were taken that neither too much nor too little of the chloride of lime were added—then another source of complaint would disappear."

When used for cooking purposes it is well to boil the chlorinated water for a couple of minutes, so as to drive off as much as possible of the chlorine.

✠

Community Health in Pittsburgh.—The *Boston Medical and Surgical Journal* for May 10, 1917, reports progress of the health survey of the Metropolitan Life Insurance Company in Pittsburgh and environs. The general sickness rate is 16 per thousand, or one person in 63. Among employees in the iron and steel mills the sickness rate was 20 per thousand and among glass factory workers it was 19 per thousand.

The principal diseases enumerated are: Accidents and injuries, 9.7 per cent; rheumatism, 8.3 per cent.; influenza, 7.6 per cent.; pneumonia, 5.7 per cent.; colds, coryza and rhinitis, 4.3 per cent.; tuberculosis of the lungs, 4.1 per cent.; diseases of the stomach, 4.0 per cent.

In general, the findings for diseases and conditions enumerated are found to be the same for Greater Pittsburgh as for the entire state of Pennsylvania.

✠

Mouth Infections and Disease.—Hudnut emphasizes the infections that may result from bad teeth. Among these are arthritis, septic endocarditis, various septicemias, tuberculosis, nephritis, arteriosclerosis, pancreatitis, peptic and duodenal ulcers, some cases of appendicitis, chorea, neurasthenia, general malaise and others.

"A well advanced case of pyorrhea alveolaris with its discolored, denuded and loosened teeth, bathed in pus, is a disgusting sight. It has been estimated that in such cases, three or four drams of pus or more may be swallowed with the food."

He cites the case of a man of 45 in good health whose right arm became first painful, and gradually quite useless. By accident, he broke off the gold crown of one of his teeth, and immediately noticed a very bad taste and odor. The following morning, his arm had begun to improve, and ten days after the abscessed root was extracted, the arm was practically well.

The most important sources of mouth infection are: 1. General filthy condition of the mouth; 2. Set bridges and crowned teeth; 3. Carious and broken off teeth; 4. Impacted and partly erupted wisdom teeth; 5. Inflammation of the gums, including pyorrhea.

The article appears in the *Boston Medical and Surgical Journal* for May 17, 1917.

✠

Infection of Bubbling Fountains.—That present types of bubblers may be a source of communicable disease is the conclusion of H. A. Whittaker of the Minnesota State Board of

Health. Writing in *Public Health Reports* for May 11, 1917, he describes bacteriological examinations which show that not only are the surfaces of the bubblers very commonly infected with mouth bacteria, but even the water will at times show these organisms.

Seventy-seven drinking fountains in use at the University of Minnesota were examined, representing 15 different types. All of these were constructed improperly with regard to protection from contamination by the consumer. Swabs from the bubbler surfaces showed that 80 per cent. were infected with streptococci, which it is reasonable to assume came from human mouths, since the water supply feeding the fountains does not contain this organism.

Even the water from the bubblers was infected with streptococci in 11 per cent. of the fountains.

Present types of bubblers are criticized, first, because all of them discharge the water vertically; second, because the low jet permits the lips of the consumer to touch the bubbler at the nozzle; third, because certain types having closed receptacles around the point of discharge retain the contaminated water falling back from the lips of the consumer.

Following the suggestion of Pettibone, Bogart and Clark of the University of Wisconsin, a fountain has been designed which obviates these difficulties by means of the slanting jet and suitable wire muzzles, which prevent the consumer from mouthing the nozzle of the bubbler. Trials covering several weeks proved that neither the nozzle nor the water were infected by streptococci with this apparatus.

✦

Protozoölogy.—F. G. Haughwout, Manila, P. I. (*Journal A. M. A.*, May 19, 1917), says that the importance of the protozoa as the causes of many serious ailments is well recognized, and with the opening up of new trade routes and the resulting conditions they are gradually establishing themselves in temperate climates in many cases. There has been no lack of literature on the subject but little has been done or said as to the exceeding importance of the teaching of zoölogy to medical students and the tendency of physicians to place the parasitic protozoa entirely apart and separate from the other members of that great phylum has undoubtedly retarded progress in our knowledge of the parasitic organisms. The protozoa exist in surroundings of great variety from roadside ditches and marshes, in decaying organic matter as well as parasitic in animals and plants. The most striking point of difference between the parasitic forms and others that lead a free life is that they have adopted as an environment the body tissues of animals and plants instead of the sea, a pond or a tuft of moss. The investigator in the subject of parasitic protozoa must have not only a broad knowledge of the entire field of medicine, but also a sound biologic training which will guide him far afield from the bedside in search of the solution of many medical and sanitary problems. The medical specialist in protozoölogy must be none the less a zoölogist and Haughwout holds that it is quite possible to make an exceedingly workable combination of the practical and the scientific in this work. Many medical men that he has met have frankly confessed to have never seen a living ameba or trypanosome. In view of the wealth of material which may be secured in the neighborhood of great cities in the United States this is unfortunate. He gives an outline of his plan of teaching, leading the students up to the parasitic amebas by a fairly comprehensive preliminary study of the nonparasitic forms of the region and climate, and finds that it is quite possible to give his undergraduate students adequate instruction along these lines in a course of sixty-eight hours and this is still further extended and amplified in the graduate courses. Only the general outline of this method is given. The main problem is the poor preliminary preparation, though this is not so serious in the undergraduate school. But a small proportion of students so trained he finds make a specialty of protozoölogy, but this in fact is not the end sought. The endeavor rather is to fit the men for more advanced medical and sanitary work or give such of them as fancy it the foundation by which they may by their own efforts become specialists in this line.

✦

Food Stuffs Used in Liquor Manufacture.—Of the many estimates of the food value of the material used in the manufacture of distilled spirits and fermented liquors in the United States, the following statement, issued by the

War Prohibition Committee, Boston, because of its authorativeness and conservatism seems to deserve thoughtful consideration:

According to the report of the Commissioner of Internal Revenue for the year ended June 30, 1916 (page 138), there were used during that year for the production of distilled spirits in the United States, the following materials:

Corn	32,069,542	bushels
Rye	3,116,612	"
Malt	4,480,588	"
Wheat	3,373	"
Barley	148	"
Oats	9,807	"
Other Materials	68,822	"
Molasses	152,142,232	gallons

Omitting wheat, oats, barley, and "other materials," and reducing corn, rye, malt and molasses to pounds, we get a total of 3,603,911,916 pounds of grain and molasses.

The census for 1900, Vol. 9, page 602, gives the following figures as to materials used in the manufacture of fermented liquors:

Corn	483,998,984 pounds
Malt	36,385,365 bushels
Barley	11,232,599 bushels
This amounts to a total of	2,260,266,146 pounds

These seem to be the latest positive figures available. The materials used in 1916 may be estimated as follows, though there is a possible margin of error. The production of fermented liquors for the year 1900 was 38,664,584 barrels. By 1916 it had risen to 58,633,624 barrels (see Report of Commissioner of Internal Revenue for 1916, p. 145). The production increased 51.6 per cent. Assuming an increase of at least fifty per cent. in the materials used, we get 3,390,399,219 pounds.

Combining the figures for the manufacture of fermented liquors and distilled spirits, we get a total of 6,994,311,135 pounds of grain and molasses.

This omits all minor ingredients and says nothing about the fruit and glucose used in the production of various other alcoholic beverages.

In a time of food shortage, when conservation of food-stuffs is an important public question, the seven billion pounds (7,000,000,000) of food materials which are used in these industries, form an item which is worth considering.

T. N. Carver,
Edmund E. Day,
William Z. Ripley,
Edwin T. Gay,
Professors in Department of Economics, Harvard University.

Irving Fisher,
Professor of Political Economy, Yale University.

We have reviewed the statistics submitted in regard to the 7,000,000,000 pounds of food-stuffs used in the manufacture of malt and distilled liquors in the United States. It is probable that as much as one sixth of the total may be necessary for the production of denatured alcohol. At a low estimate of its calorific or fuel value the remaining five-sixths would supply the energy requirement of 7,000,000 men for a year.

Walter B. Cannon,
George Higginson Professor of Physiology in Harvard University.

Percy G. Stiles,
Assistant Professor of Physiology in Harvard University.

Irving Fisher,
Professor of Political Economy, Yale University.

Industrial Hygiene and Sanitation.

Poisons in Explosives.—The danger from accidental explosions in munition manufacture has overshadowed the less spectacular but quite as real dangers of industrial poisoning, says Alice Hamilton, Chicago (*Journal American Medical Association*, May 19, 1917), who has studied the subject under the auspices of the United States Bureau of Labor Statistics. Shrapnel plants were omitted as the shrapnel consists of black powder with lead projectiles. In the forty-one plants examined by her there were about 30,000 persons employed and exposed. Only a minority

were women and of these only forty were doing work involving serious risk. The poisons to which workers are exposed have been unfamiliar in this country but will become more familiar even after the war demand has ceased, on account of the many uses to which the products may be applied. It is almost impossible, she says, to get full accurate figures. There were only twenty-eight factories from which trustworthy data could be secured and in these she found that during the preceding year there had been only a little more than 2,500 cases of industrial poisoning with fifty-three deaths. Not all of the 2,500 were seriously poisoned. There were 111 who had nothing worse than a fulminate rash, and there were 205 cases of mild anilin poisoning, but with the exception of these the form of poisoning was always fairly serious and sometimes very much so. In the table she gives, trinitrotoluene and benzene furnish the largest proportions of fatal cases while nitroglycerin has not a single case to its credit. Nitrobenzene and trinitrotoluene proved quite dangerous, the latter being responsible for more trouble than any substance except the nitrogen oxids so commonly evolved in nitration work. These give rise to what is commonly called "fume sickness," and the danger is greatest in the nitration of cotton to nitrocellulose and in the nitration of phenol to picric acid, trinitrophenol. The higher the nitration the greater is the danger and at the time of the author's examination the cases of poisoning were so frequent from the so-called "fires" that the workmen had become fairly well accustomed to them. The tables show 1,389 cases of poisoning from hydrogen oxids (995 from nitrocotton plants, 381 from picric acid and thirteen from nitric acid works), varying in severity from light to fatal. In light cases the man chokes up and the symptoms resemble asthma and are relieved by the usual first aid remedy. Severe and fatal cases resemble those of gassed soldiers from the trenches. The well developed cases are easily recognized but the less violent poisoning may result in pneumonia which often passes for the ordinary non-occupational type. Sometimes, this may lead to gangrene of the lung or other fatal forms of pulmonary edema may occur. Men have succumbed in their first shift of work and their lungs and blood have been examined by competent experts. After the cotton has been nitrated there is no further danger of poisoning. The next step is the conversion of nitrocotton to smokeless powder, which is a different operation. The making of picric acid is a simple matter and in some improvised manufactories has been carried on in a rather reckless manner. A further danger is in the dust that forms when it is dried down. The greatest danger in the manufacture of phenol is in the benzene fumes and benzene and toluene are considered together. Just half of the cases of benzene poisoning were fatal. The fumes have a specific action on the nervous system leading to dizziness, confusion, transient excitement followed by dullness, muscular twitchings, stupor and coma, rapid respiration followed by slow, rapid pulse and subnormal temperature. Multiple small hemorrhages are formed, through a solvent action on the capillary endothelium, or enlargement of fat emboli and marked changes in the blood. All the deaths that occurred on the author's list were sudden, sometimes strikingly so. All the nitro and amido derivatives of the benzene ring have certain characteristics in common in their poisonous action but vary quite a little in some respects. Curschmann believes the higher the nitration the greater the toxicity, but sometimes the lower nitrations are more volatile or more easily absorbed and, therefore, more dangerous. The symptoms typical of poisoning of this group depend on direct action on the nerve centers, respiratory, heat regulating and vasomotor, and on changes in elements of the blood, of which the more important are the formation of methemoglobin and the destruction and subsequent forming of blood corpuscles. The volatile compounds, such as analin, nitrobenzene, produce their effects rapidly. Nitrobenzene cases of poisoning are fewer than those of anilin but more severe. The local effect of some of these compounds on the skin is much more pronounced than in the case of others. With trinitrotoluene, the absorption takes place much more slowly and instead of skin symptoms there may be degeneration of inner organs. The poisoning is not rapid, and immature workers are more susceptible. The possibility of mercurial poisoning in fulminate workers has to be considered, but at present the dermatitis which is quite common, has been

the only form recognized. Other occupational poisonings are those from the manufacture of smokeless powder and ether intoxication which is so common as to be taken as a matter of course, and it is not hard to find men who have been obliged to quit work because of the continual taste of ether in the mouth causing indigestion, constipation, loss of weight and strength. Nitroglycerin is the safest of all explosives as regards poisoning, not as regards accidents, and the precautions against these latter act also as preventives of systemic poisoning. Other poisons in gaseous form are chlorin fumes given off during the early stage of nitric acid manufacture, ammonia fumes, and sulphur dioxid. The subject is a good one for further research by all who are interested in the effects of volatile poisons on the human subject.

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Hours, Fatigue, and Health in British Munition Factories.—*Bulletin Number 221* published by the United States Department of Labor, Bureau of Labor Statistics, is of great timely interest, dealing with munition manufacture in England. The painstaking investigations carried on by the British Government will undoubtedly be of great value to this country in meeting similar problems. The British Health of Munition Workers' Committee was appointed in the middle of September, 1915, by the minister of munitions to carry on studies referred to in the title of the bulletin. Some of the more important conclusions reached are given herewith. A weekly period of rest is held to be essential. The output of munitions is not increased by continuous work. For economic and social reasons this weekly period of rest is best provided on Sunday. The committee prefers a system of shifts to overtime work, citing five reasons for this stand. Admitting, however, that overtime must continue, the committee suggests definite reductions to govern it. Women ought not to exceed the normal legal limit of sixty hours per week and the same applies to boys under sixteen years of age. There are various objections to nightwork: It is uneconomical; supervision is frequently unsatisfactory; lighting conditions are unfavorable; workers do not obtain a good rest during the day; the disarranged schedule of living interferes with proper digestion. Men engaged in very heavy labor show an optimum output when the weekly hours of labor are fifty-six, or less. For moderately heavy work the best output is obtained with sixty hours' working schedule. A ten minute break in the middle of the morning and afternoon has been found a valuable aid to output. The committee deplores the fact that munition workers in general have been allowed to reach a state of reduced efficiency and lowered health. It points out the failure to give proper attention to personal hygiene. Medical examination on admission seems indicative of a preliminary safeguard. Machinery must be safeguarded to prevent the large number of accidents. First-aid stations must be available. The committee also reports on causes, methods of prevention, and treatment for the principal industrial diseases which have been found to affect munition workers. All cases of sickness must be treated at once. Particular attention must be paid in munition factories to ventilation and lighting. Bad lighting not only decreases the output but also causes headaches and other troubles.

Bulletin No. 221 is the first of a group of bulletins to be published by the Bureau of Labor Statistics in compliance with a resolution voted April 7, 1917, by the Council of National Defense.

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Industrial Accident Mortality.—*Bulletin 207* of the United States Department of Labor, Bureau of Labor Statistics, deals with the "Causes of Death by Occupation." The bulletin is prepared by Louis I. Dublin and represents an account of the occupational mortality experience of the Metropolitan Life Insurance Company. There are available the records of 94,269 deaths that occurred in the three years, 1911, 1912, and 1913 among occupied olite males, and of 102,467 deaths in the same three years among olite females, at ages fifteen years and over, insured in the industrial department of the company. Certain definite conclusions are justified by this study. There is a clear and direct connection between the causes of death and the occupation of the deceased. Dusty trades, for instance, show a high tuberculosis death-rate. Sedentary employment likewise influences the tuberculosis mortality. An undue amount of alcoholism is associated almost invariably with an excess of cirrhosis of the liver and

of Bright's disease. The mortality from lead poisoning is high. The respiratory diseases are prominent when the worker is exposed to the cold, drafts and dampness or to violent changes in temperature. Organic diseases of the heart are frequent when the work is heavy and the cardiac powers are overtaxed. Mortality is not the only measure of the effect of industrial work. Many occupational diseases do not directly cause death and secondary diseases terminating fatally may set in.

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Hookworm in Chinese Mines.—The April issue of the *New Orleans Medical and Surgical Journal* contains an interesting article by Dr. W. L. Chow of the Hunan-Yale Medical Hospital in China, on "Hookworm Investigation in the Antimony Mines, Sinhwa, Hunan Province, China." The study was made possible by a grant from the International Health Board of the Rockefeller Foundation. The altitude of the mines is high and the soil on the surface is dry and porous; therefore there is little chance for hookworm eggs to hatch. The danger lies in the fact that infected feces are carelessly disseminated. Unless sanitary conditions are installed the mines will eventually prove an endemic centre for hookworm. Thirteen persons out of 149 proved to be infected. All of these infected persons had until recently been farmers in the rice fields. The eradication of hookworm disease in the antimony mines can be accomplished without great difficulty if proper measures are taken. The miners as well as the mine owners must be educated. To lessen the danger of importing hookworm disease into the mines it is necessary to prevent infection in the fields and to discourage the time-honored use of human excreta for fertilizer.

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The President of the American Museum of Safety has made public the reports of the Jury of Award covering the awards of the five gold medals annually conferred by the museum for noteworthy achievements in the realms of accident prevention and health conservation. The winners for 1916 are the Pullman Company, the Commonwealth Steel Company of St. Louis, Mo., the Julius King Optical Company of New York City, the Alabama Great Southern Railway Company and the Connecticut Company at New Haven, Conn. The dinner planned in connection with the presentation of the medals of the museum was cancelled on account of the present national crisis.

The museum has tendered its services to the national, state and city governments. It has also offered all of its facilities to the Council on National Defense, Washington.

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New Railroad Safety Device.—According to "Safety Engineering" (April) the Queen & Crescent Railroad has lately equipped its route with a signal system, train, and speed control. Practical tests have shown the device to be efficient. The system is entirely automatic. A train can be started under full head of steam, and will never collide with another, because the moment it enters a block occupied by another train, it is stopped by the application of the emergency brake. The device includes a caution signal which does not stop the train but slows it down to a predetermined speed and prevents the train from exceeding that speed. The speed control is a separate device which may be attached to any car of the train and can be set for any desired speed. Once set and in operation, the train cannot exceed the speed indicated.

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Two interesting accounts of how nations manage their food supply under war-times conditions can be found in the May issue of the *Monthly Review of the United States Bureau of Labor Statistics*. The articles deal with the government control of food supplies in Germany and Italy.

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In an effort to bring about coöperation in industrial sanitation and hygiene between organized labor and the division of industrial hygiene of the New York City Health Department, thirty-eight labor unions affiliated with the Central Federated Union met on February 18, 1917, and organized the Labor Sanitation Conference. The Department of Health hopes in this way to become better acquainted with the possibilities for improving safety and sanitary standards.

Communications.

May 31, 1917.

To the Editor:

In the issue of the JOURNAL of May, 1917, on page 521, under the title of "Communications," Dr. C. B. Young, late commissioner of health of Chicago, criticises the Commission on Milk Standards in part as follows:

"In as much as the very valuable report of the Commission on Milk Standards of the New York Milk Committee, published in the United States Public Health Reports for February 16, will be generally accepted by those interested in the milk question as an accurate summary of the development of the grading system, it seems unfortunate that in enumerating the cities where the plan has been taken up no mention is made of Chicago.

"This omission is all the more singular because it happens that Chicago legislation on grading milk anticipated by more than four years the position recently reached by the commission."

Doctor Young then attempts to briefly summarize the recommendations of the commission published in its last report, and draws a parallel between this and an ordinance drawn up for the city of Chicago, which he says was dated August 14, 1912.

Concerning this Chicago ordinance, Doctor Young says:

"The ordinance containing the above provisions was passed August 14, 1912,—so long ago that the commission probably forgot it when preparing in 1916 to make its latest recommendations.

"The matter of course is only of interest to those concerned with the accuracy of sanitary history and to the authors of the Chicago ordinance, Assistant Health Commissioner Godfried Koehler, and the writer."

As secretary of the Commission on Milk Standards, I feel that it is incumbent upon me to defend the commission against the suggestions of inaccuracy and unfairness to Chicago contained in Doctor Young's communication. The fact that he refers to the 1916 report of the Commission on Milk Standards as containing "its latest recommendations" makes it evident that Doctor Young is aware that the latest report of the commission is not its first report. In the last report of the commission the history of the commission's work is plainly stated, and there is also included a statement regarding the history of the grading of milk in America. A study of this history makes it impossible to understand how Doctor Young can find any support for his statement "that Chicago legislation on grading milk anticipated by more than four years the position recently reached by the commission."

The Commission on Milk Standards was organized in the spring of 1911. It held two meetings in that year, namely, in May and October, and a third meeting in January, 1912. The results of the work at these three meetings was given considerable publicity previous to the publication of the first report.

The first report of the commission was published in United States Public Health Reports, May 10, 1912. This report recommended that milk should be graded into four classes, as follows:

Class A, certified milk, or its equivalent.

Class B, inspected milk.

Class C, pasteurized milk.

Class D, milk not suitable for drinking purposes.

In this classification A and B were raw milks from tuberculin tested cows, produced in accordance with recognized sanitary safeguards, and having bacterial standards. The commission also made recommendations regarding bacterial standards, the control of pasteurization, and the use of the standard methods of the American Public Health Association for making bacterial tests of milk.

The New York City Department of Health, which was represented on the commission, adopted a system of grading on January 4, 1912, at which time the regulations provided for three grades of milk, as follows:

Grade A, for infants and children, including: certified, guaranteed, and inspected raw milks; and a selected pasteurized milk.

Grade B, for adults, including a selected raw and pasteurized milk.

Grade C, for cooking purposes.

Consequently, if the Chicago ordinance to which Doctor Young refers was dated August 14 in 1912, it was passed more than three months after the publication of the first report of the Commission on Milk Standards; more than seven months after the New York City regulations for grading milk were passed; and more than fourteen months after the first meeting of the commission.

The Commission on Milk Standards is certainly just as much "concerned with the accuracy of sanitary history" as is Doctor Young, and is much more interested in securing recognition for the grading of milk than in any controversy over priority. In drawing up the report of the commission perhaps the editorial committee should have included the statement that Chicago adopted a grading system of milk in August, 1912, but this action of Chicago certainly did not anticipate "by more than four years the position recently reached by the commission."

The several reports of the commission have all been progress reports. Its report of 1912 outlined the plan for grading agreed upon by the members at that time. Its report for 1913 further modified this plan in an attempt to make it better adapted to all communities. Its report of 1916 contained further modifications, and an attempt to make it practicable to extend the grading system even to small towns. The conclusions contained in the 1916 report are not "recent," but are merely an extension of the conclusions which were contained in its first report published in the spring of 1912.

CHARLES E. NORTH,
Secretary, Commission on Milk Standards.

Personal Notes.

President William A. Evans has been appointed general chairman of a committee on the health of employees of the National Defense Advisory Council. Dr. E. R. Hayhurst, the chairman of the Section on Industrial Hygiene, at the request of Doctor Evans has created the following subcommittees:

1. Shop and Industrial Sanitation, Dr. George M. Price.

2. Industrial Diseases, Dr. J. W. Schereschewsky, Dr. E. R. Hayhurst, Dr. B. S. Warren, and Dr. F. D. Patterson.

3. Industrial Poisons, Dr. Alice Hamilton, Dr. J. B. Hudson, and Dr. George F. Apfelbach.

4. Village and Public Sanitation, Dr. George M. Kober, Dr. Lawrence Veiller, and Dr. W. C. Woodward.

5. Ventilation, Including Heating, Prof. C.-E. A. Winslow, Mr. D. D. Kimball and Mr. Rudolph Herring.

6. Medical Supervision, Dr. Otto P. Geier, Dr. Harry E. Mock, Dr. Clarence D. Selby, Prof. Henry W. Farnum, Carl E. Smith (D. D. S.).

7. Female Employees, Dr. Kristine Mann.

8. Diagnostic Clinics, Dr. Louis I. Harris.

9. Abnormal Atmospheric Pressures, Dr. F. L. Keays.

10. Lunch Rooms, Mr. R. C. Routsong.

In each incident the first named person is to serve as the chairman of the subcommittee. Each committee is to submit both standards and recommendations (for the time being essentials only) covering the subject assigned to that committee and to arrange to conform to the following:

(a) "Items so vital that they should be embodied in contracts" which the government makes with manufacturers or others.

(b) "Items of second importance, to be brought to the attention of manufacturers, and in some instances to laborers, also eventually to be made laws," these to be transmitted within one month.

(c) "Items of third importance, to be made the subject of educational propaganda"—transmitted at more subsequent date.

The general order of application of standards and recommendations to be, first, for those industries making high explosives, next arms and ammunitions, next heavy war machinery, and thereafter other industries engaged less directly in the military preparations, and eventually, possibly to all industries.

In anticipation of the social and economic problems likely to result from the German-American War, the National Council of Defense, through its Advisory Commission on Labor and Welfare—Mr. Samuel Gompers, chairman—has appointed Mr. Frederick L. Hoffman, statistician of the Prudential Insurance Company of America, chairman of the National Committee on Statistics and Information. The Prudential has offered the resources of its statistical department to the Advisory Commission, and subcommittees will shortly be organized in anticipation of the demand for trustworthy statistical and other information required by the national committees on wages and hours, women in industry, mediation and conciliation, industrial accident-prevention, etc. The plan is to inaugurate at once a national statistical service, whereby the state of the nation regarding health, physical and social wellbeing, sickness and accidents in industry, unemployment, etc., may be presented with scientific conclusiveness from week to week, for the information of the National Council of Defense and the public at large.

*

Dr. Eugene Lyman Fisk, medical director of the Life Extension Institute, 25 West 45th Street, New York City, has been appointed a member of the subcommittee on alcohol of the Committee on Hygiene and Sanitation of the General Medical Board of the Council of National Defense, of which Surgeon-General Rupert Blue is chairman.

Surgeon-General Rupert Blue is also a member of the Life Extension Institute's Hygiene Reference Board, which is composed of one hundred of the most eminent scientists in the United States and Europe.

*

Dr. Joseph Yates Porter announces that he has resigned as state health officer of Florida and that Dr. Joseph Enoch Taylor has been appointed as his successor.

*

Mr. A. D. Hiller, formerly assistant editor of the American Journal of Public Health, and assistant to the secretary of the American Public Health Association, has been appointed agent of the board of health and milk inspector of Watertown, Mass.

Dr. Arthur Lederer has been appointed director of the state Hygienic Laboratory at Morgantown, W. Va.

*

Dr. Francis H. Slack, deputy commissioner of health of the Boston Bacteriological Laboratory, has resigned to accept the position as pathologist, bacteriologist and serologist in the Sias Laboratory, Brooklyn, N. Y.

*

Dr. David D. Brough has been appointed deputy commissioner of health of Boston to succeed Dr. Thomas B. Shea, deceased.

*

Dr. Leverett D. Bristol of Boston, Mass., has been appointed state health officer of Nebraska.

*

Dr. Charles J. McGurren has been appointed superintendent of health and secretary of the State Board of Health of North Dakota.

*

The Massachusetts State Department of Health, upon April 3, voted that lobar pneumonia be added to the list of diseases declared to be dangerous to the public health, and that that disease be declared reportable on and after May 1.

*

The following persons were elected to membership in the American Public Health Association:

J. F. Williams, M. D., Detroit, Mich., Health Officer of Detroit.

J. W. Inches, M. D., Cincinnati, Ohio, Director and Professor Hygiene and Physical Education, University of Cincinnati.

Frederic W. Howe, Framingham, Mass., Professor at State Normal School.

J. W. Duke, Guthrie, Okla., Physician, State Commissioner of Health.

Dr. Ralph Oakley Clock, Pearl River, N. Y., Assistant Director Lederle Antitoxin Laboratory.

Thorndike Saville, Cambridge, Mass., Assistant in Municipal Administration and in Geology, Harvard University.

Luther A. Riser, M. D., Columbia, S. C., Health Officer.

George J. Coleman, P. D., Wheeling, W. Va.

Myron E. Fuller, Philadelphia, Pa., Sanitary Engineer with Bureau of Surveys, Philadelphia.

P. E. Mebus, Philadelphia, Pa., Civil and Sanitary Engineer, Bureau of Surveys.

Arthur R. Reynolds, M. D., Chicago, Ill., Sanitarian.

Isaac S. Walker, Frankford, Philadelphia, Pa., Sanitary Engineer.

William Schroeder, Jr., M. D., New York City, Chief Surgeon and Medical Director of Employers Mutual Insurance Co.

W. H. Robin, M. D., New Orleans, La., Physician.

Willis P. Butler, M. D., Shreveport, La., Parish Health Officer.

Moses J. Miller, M. D., Cleveland, Ohio, Diagnostician.

Conrad H. Lieber, Oak Park, Ill., Sanitary Inspector.

Charles E. Low, M. D., Spartanburg, S. C., Director of Health.

Charles M. Siever, M. D., Manhattan, Kans., in charge of the Department of Student Health, Kansas State Agricultural College.

Kristine Mann, M. D., New York City, Physician.

F. C. Yen, M. D., New Haven, Conn.

Mr. Alton A. Cook, Morgantown, W. Va., Chemist, State Health Department.

Mr. Ira D. Joel, Middletown, Conn., Acting Director State Laboratory.

J. M. Shapiro, M. D., Denver, Col., Industrial Physician.

J. G. Frey, M. D., Cleveland, Ohio, Serologist, Health Department.

Francis L. Parker, M. D., Charleston, S. C., Chemist and Bacteriologist, State Board of Health.

Gordon Fehr, B. S., S. B., South Norwalk, Conn., Sanitary Engineer.

S. W. Welch, M. D., Montgomery, Ala., Health Officer.

Mr. J. V. Donley, Montgomery, Ala., Sanitary Engineer, State Board of Health.

Current Public Health Literature.

AMERICAN.

American City. New York.

XIV. May.

Water Costs in Cities of at Least 60,000 Population.
War Time Measures of Economic Preparedness and Social Welfare.

American Food Journal, Chicago.

XII. May.

Program for Food Production and Conservation.
The Manufacture of Sugar. J. E. Freeman.
Care of Confectionery. Walter C. Hughes.

American Journal of Diseases of Children, Chicago.

13. May.

Bacteriology of the Urine in Children with Vulvovaginitis. A. B. Schwartz.
Review of the Literature of the Past Five Years on Gonococcus Vulvovaginitis. J. C. Gittings and A. G. Mitchell.

Boston Medical and Surgical Journal.

CLXXVI. May 17.

Recent Investigations on the Bacteriology of Acute Poliomyelitis. Ludvig Hektoen.
Mouth Infections and Their Relation to Systemic Disease. P. A. Hudnut.

May 24.

A Study of Twenty-nine Cases of Echinococcus at the Massachusetts General Hospital. L. Davis and G. M. Balboni.
Mental States Responsible for Malingering. E. B. Emerson.
Observations on Measles. D. M. Lewis.

May 31.

Drug Users in Court. V. V. Anderson.
Shiftling, Charlatan and Vagabond: Who They Are and How They Arise. J. V. Haberman.
Comparative Statistics on Physical Examinations of Pupils of the Boston Public Schools from December 1, 1915, to April 1, 1917. W. H. Devine.

Journal of the American Medical Association, Chicago.

LXVIII. May 5.

An Epidemic of Septic Sore Throat Due to Milk. E. C. Rosenow and C. L. V. Hess.
Septic Sore Throat. G. W. Henika and I. F. Thompson.
Untoward Results of Prophylactic Typhoid Immunization. W. Lintz.
Endemic Index of Malaria in the Northern Sacremento Valley. F. L. Kelly and J. C. Geiger.

May 12.

The Supplementary Dietary Relations among Our Natural Foodstuffs. E. V. McCollum.

Application of the Complement Fixation Test to Tuberculosis. N. B. Burns, F. H. Sclack, P. Castleman, and K. Bailey.
Usefulness of Serums and Vaccines under War Conditions. G. W. McCoy.

May 19.

Industrial Poisons Encountered in the Manufacture of Explosives. Alice Hamilton.
The Therapeutic Value of Pertussis Vaccine in Whooping-Cough. A. I. Von Sholly.
Treatment of Carriers of Endamœba Histolytica with Oil of Chenopodium. E. L. Walker and W. Emrich.
A New and Superior Mercurial Germicide. J. F. Schamberg, J. A. Kolmer, and G. W. Raiziss.
Pertussis Vaccine: Its Value as a Curative and Prophylactic Agent in Whooping-Cough. Paul Luttinger.
The Teaching of Protozoology to Medical Students. F. G. Haughwout.

May 26.

Anaphylatoxin and Anaphylaxis. F. G. Novy and P. H. DeKruif.
An Antipoliomyelitis Horse Serum. M. Neustædeer and E. J. Banzhaf.
Poliomyelitis: Some Features in City Prevalence. C. V. Craster.

Journal of Laboratory and Clinical Medicine, St. Louis.

II. May.

Animal Inoculations Supplementary to an Introductory Course in Pathogenic Bacteriology. W. H. Manwaring and J. T. Connell.
Toxicity of Heterologous and Homologous Serums. C. E. Roser.
Concerning the Chemistry of Pernicious Anemia. T. L. Squier.

Journal of Industrial and Engineering Chemistry, New York.

IX. April 1.

A Study of Certain Ferments with a View of Determining a Method for the Differentiation of Pasteurized Milk from Raw Milk. I. Reductases. R. E. Lee and M. G. Mellon.
Is the Recovery of the Nitrogen in Sewage Practicable? W. R. Copeland.
Storage Reservoirs as a Factor in the Purification of Surface Waters. S. T. Powell.
Some Remarks on the Biochemical Treatment of Sewage with Especial Reference to the Activated Sludge Method. G. T. Hammond.
Re-æration as a Factor in the Self-Purification of Streams. E. B. Phelps.

May 1.

The Correction Required in Applying the Babcock Formula to the Estimation of Total Solids in Evaporated Milk. O. L. Evenson.
Fertilizer Value of City Wastes. P. J. Schroeder.

Journal of Outdoor Life, New York.

XIV. May.

Family Care of the Tuberculous. F. M. Stein.
Home Treatment of Tuberculous. A. Henry.

Medical Times, New York.

XLV. May.

Attitude and Responsibilities of the Physician in the So-Called Birth Control Movement. G. W. Kosmar.
Social and Legal Aspects of the Birth Control Propaganda. J. S. Sumner.
A New Phase of the Drug Addict Laws. T. D. Crothers.

Military Surgeon, Washington, D. C.

XL. May.

Recent Developments in Camp Sanitation. W. F. Lewis and R. B. Miller.
Standardization of Food Inspection. W. N. Garton.
Notes on the Organization of the French Sanitary Service. J. R. Church.

Modern Hospital, St. Louis.

VIII. May.

Urban Community Plan for Health and Medical Service. D. B. Armstrong and J. H. Berkowitz.
Ice Cream—Its Composition, Manufacture, and Value. J. P. Street.
Standardization of Hospitals—Comment on the Classification. J. A. Hornsby.

Medicine and Surgery, St. Louis.

I. May.

Gonorrhea and Its Dangerous Possibilities. C. M. Whitney.
Clinical Consideration of the Wassermann Reaction. M. G. Wohl.
Behavior of the Wassermann Reaction in Cases Receiving Mixed Treatment. H. C. Solomon.
The Fetich of the Wassermann Reaction. H. H. Hazen.

Southern Medical Journal, Birmingham.

X. May.

Public Health Facts and Their Presentation. R. K. Flannagan.
Control of Contagious Diseases. C. V. Reynolds.
Advances in Public Health Work in South Carolina During the Past Year. J. A. Hayne.
The County Unit Plan in Public Health. M. M. McCord.

U. S. Public Health Reports, Washington, D. C.

32. May 4.

Typhoid Fever and Municipal Administration. A. W. Freeman.

May 11.

Conference of Health Authorities.
Drinking Fountains. H. A. Whittaker.
Mechanical Fans. S. B. Grubbs.

May 18.

Control of Poliomyelitis.
Mental Examination of Immigrants. E. H. Mullan.

May 25.

Standard Morbidity Tables.
Public Health Administration in South Bend, Ind. Carroll Fox.

BRITISH.

Journal of State Medicine, London.

XXV. April.

The Rôle of the Midwife and the Protection of Motherhood. Lady Barrett.

The Prevention and Arrest of Certain Epidemic Diseases in War Time. S. M. Copeman.

The Control of Rat Plague. C. O. Stallybrass.

Medical Officer, London.

XVIII. April 21.

Measures to be Taken to Prevent Contamination of Food by Flies. J. Cates.

May 5.

The Health of the People.

Some Problems of Child Welfare. G. Jessel.

May 12.

Health of Munition Workers—Interim Report.

The Proposed Ministry of Health—Considerations and Suggestions.

BOOKS AND REPORTS RECEIVED.

Water Purification. *By J. W. Ellms, 1917. McGraw-Hill Book Co., Inc. New York City. Pp. 485. Price, $5.00 net.*

Sanitation Practically Applied. *By Harold B. Wood, M. D. 1917. John Wiley & Sons, Inc. New York City. Pp. 473. Price, $3.00 net.*

Mental Conflicts and Misconduct. *By William Healy. 1917. Little, Brown and Co., Boston. Pp. 33. Price, $2.50 net.*

The Psychology of Special Abilities and Disabilities. *By Augusta F. Bronner. 1917. Little, Brown and Co., Boston. Pp. 268. Price, $1.75.*

Food Poisoning. *By E. O. Jordan, M. D. 1917. University of Chicago Press, Chicago, Ill. Pp. 115. Price, $1.00 net.*

Report of the State Board of Health of Wisconsin, 1915–1916.

State Work against Infantile Paralysis. *Steps Taken by Forty-Three Departments of Health in 1916. Institute of Public Service, 51 Chambers Street, New York City.*